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CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT.

PURVIS ORATION on Prognosis. By ROBERT HUTCHISON, M.D., F.R.C.P. 1

ORIGINAL ARTICLES.

Studies in Renal Disease: "Lipoid Nephrosis." By T. IZOD BENNETT, M.D., M.R.C.P., D. T. DAVIES, M.B., M.R.C.P., and Prof. E. C. DODDS, M.D., Ph.D. 3

Serum Prophylaxis in Measles. An Evaluation of the Resulting Immunity. By Prof. A. NEAVE KINGSBURY, M.B., B.S. —(*Illustrated*) 7

A Case of Osteogenesis Imperfecta. By DONALD HUNTER, M.D., M.R.C.P. —(*With Coloured Plate*) .. 9

Gastro-duodenostomy. By E. R. FLINT, F.R.C.S. ... 12

The Importance of Motility of Bacteria in Classification and Diagnosis, with Special Reference to *B. pseudotuberculosis rodentium*. By J. A. ARKWRIGHT, M.D., F.R.C.P., F.R.S. 13

Concentrated Carbon-arc Light. A Simple Method to Improve the Efficiency of the Finsen Treatment. By SVEND LOMHOLT, M.D. —(*Illustrated*) 15

Treatment of Tuberculosis by Mr. Spahlinger's Methods. By THOMAS NELSON, B.M., B.Ch., M.R.C.P. 16

CLINICAL AND LABORATORY NOTES.

A Case illustrating the Effects of Prolonged Application of Cold to the Eye. By K. E. MADAN, M.D. 18

Blackwater Fever in Scotland. By JAMES S. ANDERSON, M.D., D.P.H. 18

MEDICAL SOCIETIES.

Royal Society of Medicine: Sections of Electro-Therapeutics and Surgery. Surgical Aspects of Diathermy 19

Royal Academy of Medicine in Ireland: Section of Medicine 21

Edinburgh Obstetrical Society: Diabetes and Pregnancy 22

REVIEWS AND NOTICES OF BOOKS.

The Elements of Medical Treatment. By Robert Hutchison, M.D., F.R.C.P. 23

Principles of Medical Treatment. By George Cheever Shattuck, M.D., A.M..... 23

Rheumatism: Its Meaning and Its Menace. By Lewellys F. Barker, M.D., and Norman B. Cole, M.D. 23

Aviation Medicine. By Major Louis Hopewell Bauer, A.B., M.D. 23

Thérapeutique Chirurgicale Ophtalmique. By Prof. C. Duverger and Prof. E. Velter 24

Rhinogene Neuritis Retrobulbaris. By Prof. Dr. J. Meller and Dr. Oscar Hirsch 24

Die Hypertoniekrankheiten. By Dr. Eskil Kylin..... 24

The Abdomen in Labour. By Norman Porritt, M.R.C.S., L.R.C.P..... 25

Physical Chemistry in Biology and Medicine. By Prof. J. F. McClendon, Ph.D., and Grace Medes, Ph. D. 25

The Pedigree of the Human Race. By H. H. Wilder, Ph.D..... 25

Goiter and Other Diseases of the Thyroid Gland. By Arnold S. Jackson, M.D. 25

Synthetic Anatomy. By J. E. Cheesman 26

REPORTS AND ANALYTICAL RECORDS.

Para-Thor-Mone, Lilly. — Acetylarsan. — Thorne's Extra Super Crême Toffee 26

THE CONDUCT OF MEDICAL PRACTICE.

XXVI.—Cases of Poisoning and Suspected Poisoning. By G. ROCHE LYNCH, M.B., B.S., D.P.H. 27

NEW INVENTIONS.

Prostatic Diathermy (G. F. Stebbing, M.B., B.S.)— (*Illustrated*) 30

Combined Scissors Needle-Holder for Perineorrhaphy (W. McK. H. McCullagh, M.B., B.Ch., F.R.C.S.)— (*Illustrated*) 30

LEADING ARTICLES.

HOSPITAL ISOLATION OF MEASLES 31

IMITATION AS A FACTOR IN SUICIDE..... 32

THE MECHANISM OF VIRUS INFECTIONS 32

ANNOTATIONS.

The Pathology of Epidemic Encephalitis..... 34

A Diphtheria Film 34

Ultra-Violet Rays and Vaccine Therapy..... 35

The Synthalin Treatment of Diabetes Mellitus 35

Tropical Typhus 36

Mental Hygiene and Migration 37

Chemistry of Cardiac Contraction..... 37

The M.O.H. and His Authority 38

Injury to the Skin 38

Small-pox in the North.... 39

Circumcision and Carcinoma 39

The Rockefeller Foundation 40

THE SERVICES.

Royal Army Medical Corps.—Indian Medical Services.—Death in the Services..... 40

MODERN TECHNIQUE IN TREATMENT.

CCIV.—Treatment of Patients with High Blood Pressure. By Sir HUMPHRY ROLLESTON, M.D., F.R.C.P. 41

SPECIAL ARTICLES.

Preservatives and Colouring Matter in Food. The New Regulations 42

Paris: Medical Secrecy.—The Centenary of Laënnec 43

Medicine and the Law: Medical Evidence of Insanity 44

Public Health in the Local Legislation of 1926..... 49

University College, London, and a Stolen Dog. A Summons Dismissed 50

The Treatment of Corns. By E. G. V. RUNTING.— (*Illustrated*) 51

OBITUARY.

Joseph Ebenezer Adams, M.S., F.R.C.S.—(*With portrait*) 55

Thomas Strangeways Pigg Strangeways—(*With portrait*) 56

PUBLIC HEALTH SERVICES.

Reports of Medical Officers of Health: A Brief Survey 45

School Medical Service: A Survey of 1925 46

Mental Hospital Reports... 47

Infectious Disease in England and Wales 48

CORRESPONDENCE.

Adolescent Albuminuria (Dr. Geoffrey Evans) 53

The Incubation Period of Tuberculosis (Dr. F. G. Bushnell) 53

Pasteurisation of Milk (Dr. C. Maddock)..... 53

The Practice of Pathology 54

Medicine or Surgery for the Oculist? 54

Loss of Memory (Dr. M. Hamblin Smith) 55

Tuberculosis of the Kidney (Dr. W. M. Crofton)..... 55

MEDICAL NEWS.

University of Oxford 57

University of Cambridge... 57

University of Durham..... 57

University of Leeds..... 57

University of London..... 60

Medical Society of London 57

Cost of Irish Mental Patients 16

Swindon Hospital Service.. 18

Birmingham Hospital Saturday Fund 18

Street Accidents and Insurance at Sheffield 49

Domestic Servants and Contributory Schemes 49

Joint Nursing and Midwives Council (Northern Ireland) 51

Central Association for Mental Welfare..... 52

Donations and Bequests.... 55

Royal Institution 60

James Mackenzie Institute for Clinical Research..... 60

NOTES, COMMENTS, AND ABSTRACTS.

An Institute for the Physical Training of Boys. By W. H. BATTLE, F.R.C.S. —(*Illustrated*) 58

Mathematics for Non-Mathematicians 58

Health and Sickness in the Nursery..... 59

Swedish Race-Hygiene 59

Queen Square 59

Health Conditions in Cyprus 59

Medical Diary 57

Appointments—Vacancies.. 60

Births, Marriages, Deaths 60

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Perhaps because of the inherent difficulties of the subject, prognosis has been less carefully studied than either diagnosis or treatment, and I know of no really good book upon it in the English language; indeed, until comparatively recently there was no book of any kind devoted entirely to prognosis since the Hippocratic writings, and by prognosis Hippocrates meant, of course, something wider than we mean by it now. There is, it is true, a great deal of material, statistical and other, bearing upon the prognosis of particular diseases scattered through current medical literature, but very little of it has found its way into the text-books, and any young physician who was prepared to devote a lifetime to the collection of his facts and observations might in his later years produce a really good treatise on prognosis which would make the whole profession his debtor.

In spite, however, of the difficulties of the subject, it is certainly a good mental training to try to form as accurate a forecast as one can of the course of every case of serious disease which one has to deal with, even although the event will inevitably falsify one's anticipations with disappointing frequency.

Prognosis, rightly understood, is not merely a question of telling whether a patient will survive or not—"immediate" prognosis, as it is called. It is much wider than that. It should include the consideration of how long life is likely to be prolonged, and, in the event of a fatal issue, the mode of death, or, if recovery is anticipated, when it will take place, whether it will be complete, at what period the patient will be fit for work, and so forth, all of which considerations may be grouped under the term "remote" prognosis. It includes, in short, a complete foreknowledge of the whole course of events.

In practice one has to form a prognosis in three sets of circumstances, each governed by different conditions: (1) Where the question of the expectation of life or health arises in persons presumably healthy; (2) in acute self-limited disease; (3) in chronic disease, whether curable or inevitably progressive. We may consider the prognostic indications in each of these circumstances separately.

PROGNOSIS IN THE HEALTHY.

Prognosis in the presumably healthy is the essential business of the examiner for life assurance, and its object is to forecast as accurately as possible how long the individual is likely to live. One cannot, of course, allow for all "the changes and chances of this mortal life," but some considerations are of special importance. First of these, naturally, is the subject's present age and also, seeing that longevity is largely a matter of heredity, the age at death of his immediate relatives. Nothing, in fact, contributes so much to length of days as a wise choice of ancestors. Much importance, too, will be attached to occupation and habits. On the other hand, questions of build and physique are probably of much less moment than is usually supposed. Pale, weedy subjects often potter on to a green old age, improving in health as they go, whilst the florid and muscular succumb in middle life to acute disease or a cerebral hæmorrhage. Thin people are better lives than fat, for the more rotund the figure the more rapidly does one roll down the hill of life. The state of the chief organs will rightly demand attention, especially the condition of the heart and arteries, the height of the blood pressure, the presence or absence of emphysema, and the efficiency of the kidneys. Functional dyspepsia, however, is no bar to long life, indeed, rather the reverse. On one very important matter bearing upon life expectation it is, unfortunately, difficult to form an opinion unless one happens to be the patient's family doctor—I mean the capacity of "resistance" to acute infections. The general appearance of the subject is no guide here. Healthy-seeming, robust individuals, indeed, often offer much less "resistance" than those of a more fragile type, except, perhaps, to infection by tuberculosis. Putting aside this difficulty, it is only by the careful consideration of such points as I have indicated that one is able to form a reasonably accurate estimate of what, barring accidents, is the individual's chance of surviving to the natural term of human life. If, however, he is found not to be really healthy, but to present signs of incipient or old-standing disease in any of the important organs the prognosis must be arrived at on the same considerations as in a case of chronic disease. About this I shall have something to say immediately.

PROGNOSIS IN ACUTE DISEASE.

Prognosis in acute self-limited disease—not of a necessarily fatal sort—resolves itself into the question, Can the patient be kept alive until the malady has run its course? In arriving at a judgment upon this question the patient's age is, again, of first importance, for in acute disease, of which pneumonia may be taken as a typical example, age has more to do with the chance of recovery than anything else. To quote Sir Andrew Clark once more, "No healthy person below the age of 40 ought ever to die of acute disease," and although, like most medical aphorisms, this has to be taken with a grain of salt, it does embody the fundamental truth that youth is the patient's chief ally. In this connexion I once investigated the mortality of pneumonia at the London Hospital over a period of ten years, the statistics covering some hundreds of cases, and found that the death-rate increased by about 10 per cent. for every decade of advance in age of the patient. Compared with age no other factor in the case seemed much to affect the outlook. One must take into account, of course, the patient's physiological age as well as his age by the calendar, and it is assumed that up to the time of the illness he has been in good health. Acute disease supervening upon some chronic disorder is always more dangerous. On the other hand, the patient's "physique" is no more a guide to his chances of

overcoming an acute infection than it is to his prospects of longevity in health. The condition of the chief organs is of the first significance, those which most demand attention being the heart, kidneys, and lungs, in that order of importance. Much depends upon the heart, for, in acute disease, a patient "lives as long as his left ventricle." Unfortunately, we have no means of directly estimating the staying power of the heart; some such means is a great desideratum in all prognosis. Some clinical indications are of help, however. Thus a steadily increasing rate of the pulse with a tendency for it to become irregular when the patient turns over in bed is a disquieting sign, and so is the disappearance of the first sound at the apex. A wide departure from the normal pulse-respiration ratio in either direction should always cause anxiety. A low blood pressure is unfavourable, and in such a disease as pneumonia there is no better guide to prognosis than the relation between the systolic pressure and the pulse rate. So long as the pressure (in millimetres) is higher than the pulse-rate per minute, things are going well; if the ratio is reversed then the outlook is bad. Such a sign of general circulatory failure as coldness of the extremities is always a very grave portent.

Some general indications may also aid one. Thus a moist skin and a moist tongue are of better omen than dryness of these organs, and constipation is better than diarrhœa. Ability to take food is always favourable, and the physicians of former days attached great importance to it. Heberden considered loss of appetite "the despair of Nature, yielding up her power to the force of the disease." On the other hand, the temperature is of much less prognostic value than a patient's friends usually suppose, and all that one can say of it is that the gravity of a high temperature is least in a child and greatest in old age. The degree to which a patient is maintaining or losing strength may be judged to some extent from his position in bed. A persistent dorsal decubitus, and, still more, a tendency to slip down in the bed, are bad signs, whilst an ability to lie on the side is favourable. The grip of the hand is a useful gauge of strength, and so is the timbre of the voice. I was once told by a clergyman of large experience in visiting the sick that he could tell at once by the degree of resonance in a patient's voice whether he was better or worse. A consideration of all these factors taken in conjunction with what is known as to the statistical rate of recovery in the particular disease will usually enable one to form a fairly trustworthy estimate of the patient's chances.[1] What is most likely to falsify one's hopes is the supervention of sudden heart failure, but this is unforeseeable.

PROGNOSIS IN CHRONIC DISEASE.

In forming a prognosis in chronic cases the first consideration is whether the malady is of its very nature a mortal one or whether it is susceptible of cure, or at least of arrest. In cases of the former category, of which lymphadenoma may be taken as an example, the average duration of the disease as shown by statistics will enable one to form at least a rough estimate of the period to which the patient's life is likely to be prolonged, but his general condition must also be taken into consideration. In wasting disorders, for instance, a well-nourished patient is likely to last longer than one who is already emaciated. Much, also, will depend upon the patient's "resistance" and upon the degree of "virulence" of the disease in his particular case, and these important factors can often only be appreciated by watching the progress of events for a period.

In chronic diseases which are capable of arrest, or even cure, such as pulmonary tuberculosis and diabetes, the resistance of the patient and the type of the disease play such a preponderating part that it is never wise to make a forecast until the patient has been under observation for some time, and it is in such cases that hasty prognosis is most to be deprecated. Apart from this the same general considerations must guide one, as in cases of chronic incurable disease, whilst much importance must also be attached to the presence or absence of "complications." In no class of case, also, have the patient's habits and surroundings a greater influence on the march of events.

CAUSES OF ERROR.

We may now consider briefly the chief causes of error in prognosis. Easily first amongst these is wrong *diagnosis*. I remember a good many years ago seeing in consultation a lady who had been suffering for some months from symptoms of dyspepsia and had lately taken to vomiting all food. On examination of the abdomen I felt a large, hard and irregular lump in the epigastrium. I concluded that the patient was suffering from cancer of the stomach, and told her husband that she could not recover. A few days later, however, an enema removed a big scybalous mass from the bowel, the tumour disappeared, and with it all the patient's symptoms! My prognosis here was wrong because my diagnosis was wrong, and so it must ever be, for accurate prognosis depends first and foremost upon exact diagnosis, and it will be found, I think, that much uncertainty as to prognosis in practice is really due to the fact that the doctor is not quite sure what he is dealing with.

Another source of error is the attaching of too much importance to physical signs and too little to the patient's general condition. This usually leads one to make too gloomy a forecast. In the same way what has been called the "post-mortem type of mind" in a doctor tends to make him take too serious a view of disease. He has a very clear vision of the structural changes in the patient's organs, but is apt to forget how long a hopelessly damaged machine is able to go on running.

A common mistake, which can hardly be avoided altogether, is failure to allow for possible complications—for the supervention of embolism or pulmonary œdema or a sudden hæmorrhage, and so forth. Such events are so unpredictable that it is always justifiable—and wise—to hedge by saying "the outlook is good—*provided no complication arises.*" Our inability to estimate the reserve power of the heart which has been already deplored, is another and fertile source of falsification of the best-laid prognoses. In the present state of our knowledge this source of error is, apparently, unavoidable.

Lastly, it must be frankly recognised that a wrong prognosis is often the result of a failure or refusal to face the facts. Some doctors, out of kindness of heart or from a fatuous sort of optimism or inability to admit that they are beaten, keep on promising recovery when a cooler judgment would recognise that the game was up. This is an error, albeit an excusable one, for it is only by an entirely judicial weighing of the evidence, without bias one way or the other, that accuracy in prognosis is to be reached. It is bad to "give up" a patient too soon, but, from the point of view of prognosis, it is almost as bad to place too much faith in the popular adage, "While there is life there is hope."

Apropos of this aspect of our subject, it might be supposed that a doctor's own temperament would influence his prognosis, that the optimist would tend to take a hopeful view, and the pessimist a gloomy one. I doubt, however, whether this is so. At any rate, so far as I have been able to observe, a man may be a pessimist in his general outlook on life and yet be as hopeful in his attitude to disease as anyone else. Young men, indeed, who ought to be optimists, are generally more gloomy prognosticians than the old, for, like the post mortem-minded doctors spoken of above, they have not learnt by experience how well a patient can get on even although his organs are seriously impaired. I have an impression, too, that women tend to be less inclined to the rosy view than

[1] It need hardly be said that a knowledge of the statistical rate of recovery is of only limited value in *individual* prognosis. If, for example, a patient is told that the mortality-rate of his disease is 30 per cent. he naturally wants to know whether *he* is likely to be one of the unfortunate 30. It does, however, give a rough indication of the odds against which he has to fight.

men—but this may be the result of natural timidity or over-conscientiousness. Anyhow, one should always try (in the words of *Punch*) to be neither a "pooh-pooher" nor a "wind-upper."

WHAT THE PATIENT SHOULD BE TOLD.

Having formed a prognosis the question arises, Should one communicate it to the patient, or, in other words, "Should the doctor tell?" Now the first thing to be remarked on this question is that a patient is often curiously incurious as to the outcome of his disease—he is much more likely to be interested in its cause or its treatment. Whether this may be for the reason that he is afraid to ask I do not know, but the fact remains, and it is more likely to be the relatives who will inquire as to his chances. One must be on the watch, however, as Dr. H. W. Gardner has said, against unconscious telling. "Beware," as he puts it, "the unguarded word, the unguarded hesitation, or even the unconscious sigh," any of which may "give the show away." As to conscious and deliberate telling, it need hardly be said that if the prognosis is favourable the question does not arise, for nothing but good can then come from declaring one's opinion, although it is always prudent, as I have pointed out before, to qualify it by the rider "provided there are no complications," and to remember the wise saying that in matters of prognosis a doctor should never say "always" or "never." An unfavourable verdict, however, is a totally different matter, and opinions differ as to what course one should take about it. Dr. Samuel Johnson had no doubt on the point. "I deny," he said, in his down right way, "the lawfulness of telling a lie to a sick man for fear of alarming him. You have no business with consequences: you are to tell the truth. Besides, you are not sure what effect your telling him that he is in danger may have. It may bring his distemper to a crisis, and that may cure him." With all respect to the great moralist, however, the matter is not quite so simple as that. The doctor *has* a responsibility for the consequences of what he says to a patient, and so far from a gloomy prognosis "bringing his distemper to a crisis," it is much more likely both to depress the patient's power of opposing the disease, and so, perhaps, turn the scale against him, and to discourage those in attendance with the knowledge that they are fighting a losing battle. We must never forget that, as Coleridge said, "he is the best physician who is the best inspirer of hope"; or that, in Biblical language, "We are saved through Hope." On the other hand, it may be desirable that the patient should know that he is in danger. He might wish, for instance, to make a disposition of his worldly goods, to send for someone whom he loves, or even, in the old phrase, "to make his peace with God." In these circumstances the practice with most doctors, and it is probably on the whole the best, is to take some discreet relative into confidence and to leave it to him or her to tell the patient if it is thought wise.

On the other hand, if the patient insists on knowing the truth, the whole truth, and nothing but the truth about his condition, one is bound to tell him, for, as someone has said, "one must not lie to a dying man"; but it is our bounden duty in such circumstances to try "to speak the truth with kindness." I have been surprised, as a rule, to find how well the sentence is taken. Patients are not such cowards as their friends are apt to imagine, and the verdict is often received almost with a measure of relief, for the patient has probably long suspected the true state of affairs, and the doctor's confirmation of his suspicions puts a final end to all tormenting uncertainty. It need hardly be said, however, that one should not communicate a fatal prognosis even to the friends, and still less to the patient himself, unless one is sure "beyond a peradventure," and it may be advisable in many cases where one is pressed for an opinion, to leave a loophole both to serve for one's own escape if need be and to admit a ray of hope to the bedside meantime. For it must never be forgotten that a bad prognosis which proves mistaken is less likely to be forgiven—and rightly so—than a good prognosis which is falsified by the event. Further, one should never aim at an impossible degree of accuracy. It may be justifiable to foretell a fatal issue, but one is rarely justified in saying exactly when it will take place. The guess is almost certain to be wrong, and the miscalculation is sure to be cast up against one afterwards. As an experienced practitioner once said: "If your forecast is correct you get no credit for it, and if it is wrong you are thought to be a damned fool." For the same reason it is never wise to try to express the prognosis mathematically and to say that the chances of recovery are 1 in 20, or 1 in 100, and so on, even though the friends sometimes ask one to do this. To speak thus may give an impression of accurate knowledge, but the impression is really false, for there are too many uncertain factors in the calculation. The method may sometimes be of use in expressing an otherwise healthy person's chance of surviving a particular operation, the mortality of which has been established on a wide statistical basis, but in ordinary medical prognosis it should be avoided.

Finally, there can be no doubt that to "drop a brick" (as medical students say) in prognosis does more harm to a doctor's reputation than an error in diagnosis. This, of course, is quite unjust, for a wrong diagnosis may cost a patient his life, which can hardly be said of a prognosis however false. It must be remembered, however, that the patient and his friends have often only a vague idea of what the diagnosis really is, and it is easy to cover one's tracks when making it, whereas everyone knows whether the patient has survived or not. It is wise, therefore, not to prophesy unnecessarily, but at the same time to remember that on the whole a good prognosis pays best both for the patient and for the doctor, and so if one *must* prophesy to try, if at all possible, to prophesy smooth things.

STUDIES IN RENAL DISEASE: "LIPOID NEPHROSIS."

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IT has become a commonplace of medical teaching that nephritis usually manifests itself in one of two forms: (1) the type characterised by œdema, and (2) the type associated with high blood pressure and other cardiovascular phenomena, nitrogen retention in the blood, and uræmic symptoms. These two clinical types are the néphrite hydropigène and the néphrite azotémique of French observers. It is likewise a commonplace that, whereas pure examples of one or other of these types are frequently seen, it occasionally happens that one form may merge into the other, or that at least some degree of one type may become grafted upon a case exhibiting chiefly the other group of symptoms.

The distinction between the two types of disorder can be set out as follows:—

I.	II.
Œdema.	No œdema except from cardiac failure.
Normal blood pressure.	Raised blood pressure.
No cardiac hypertrophy.	Cardiac hypertrophy.
Oliguria.	Polyuria or suppression of urine.
Marked albuminuria.	Slight albuminuria.
Normal excretion of urea.	Urea excreted in low concentration.
High specific gravity urine.	Low specific gravity urine.
No nitrogen retention.	Nitrogen retention.
No signs or symptoms of uræmia.	Uræmia common.

Whilst many of the clinical features of these two syndromes have been recognised since the days of Bright, the interrelation of the two has been the subject of such confusion, and the relation of each to the macroscopic appearances of the kidneys seen at autopsy has often been so contradictory that nephritis has remained a subject of the utmost complexity to all students of medicine, whether qualified or unqualified.

If the clinical and laboratory features of the dropsical type of renal disorder are examined, it is apparent that the evidences of defective kidney function are not considerable. There is albuminuria, often of massive proportions, which seems inexplicable on any ground save that of damage to the kidneys; there is marked œdema, but this is a symptom which cannot readily be produced experimentally by any action on the kidneys; and beyond these symptoms we have a series of findings almost entirely negative, which points to the renal function being generally efficient rather than deranged.

The Conception of Nephrosis.

In recent years the term nephrosis has occurred with increasing frequency in medical literature. It appears to have been originally suggested by F. Müller[1] to emphasise those types of renal disease in which purely degenerative rather than "inflammatory" lesions are conspicuous, the term nephritis being reserved for the latter. German writers have gradually accepted this conception as one of primary pathological importance, and the work of Volhard and Fahr[2] and of Munk[3] has done much to establish the term and harmonise it with certain clinical findings.

It may be apposite at this point to recall the large number of examples of supposed renal disorders in which actual inflammatory reaction of the kidney tissue cannot be proved; many of the "renal" complications of pregnancy, the majority of cases of "hydropiginous" or "dropsical" nephritis in children, and probably most of these cases of "nephritis" seen during the late war fall into this group, the microscopic appearances in the kidneys being almost purely degenerative. According to the conception of Munk,[4] all renal disease with œdema apart from heart failure should be classed as nephrosis, whilst cases with hæmaturia, uræmia, and cardiovascular complications constitute true nephritis. When a water-logged patient gets an attack of hæmaturia, and the blood pressure rises and nitrogen retention appears, it is nephritis complicating nephrosis; when, on the other hand, a patient after a febrile hæmaturia with transient hyperpiesia passes into a condition of anasarca, that is nephrosis supervening upon nephritis. It must be noted that in contrast to these views many British pathologists hold that the ætiology of all kidney disease is toxic, degeneration being always the first effect and reaction a later but not inevitable consequence, and that degeneration is itself an inflammatory phenomenon, whether followed by reaction or not.

The Blood-lipoids in Renal Disorders.

In 1911 Chauffard, Laroche[5] and Grigaut[6] observed that in nephritic œdema there was frequently excess of cholesterol in the blood, whereas in cardiac œdema the cholesterol was never increased. This was confirmed in the following year by Widal, Weill and Laudat,[7] who made a careful study of the total lipoids, and found that in cases of renal disease massive albuminuria was essentially the symptom correlated with hypercholesterolæmia. They noted that in these cases there was no nitrogen retention, a normal urea excretion, and no cardiovascular change, but do not appear to have laid much stress on their discovery, as they draw the conclusion that lipæmia and hypercholesterolæmia do not form so special a syndrome as chloride or nitrogen retention does. In 1902 Kaiserling and Orgler[8] had shown that in certain rare specimens of kidneys seen at autopsy doubly refractive lipoids were the cause of the peculiar greasy deposits which had led to such organs being termed myelin kidneys. Adami and Aschoff[9] shortly afterwards proved that such lipoids were chiefly in the nature of cholesterol esters, and Munk[10] fully recognised this type of lipoid degeneration. Three examples of such kidneys have been described by McNee,[11] who in 1922 summarised the existing knowledge of the subject. Further reference was made by Stewart,[12] and Parkes Weber[13] demonstrated a similar specimen at the Royal Society of Medicine in 1924. But in none of these cases was the connexion between these pathological specimens and a precedent hypercholesterolæmia referred to, save in the last, where Parkes Weber remarks "one should remember the frequency of hypercholesterolæmia in uræmic and chronic nephritic cases," showing that even at that date the connexion was imperfectly realised, the true fact being that hypercholesterolæmia is found essentially in hydropiginous and non-uræmic conditions. This is brought out in the careful observations of Dyke,[14] who in 1924 published an account of six cases of dropsical renal disease in which lipoid degeneration was present in the renal tubules at autopsy. In three of these cases there were no cardiovascular changes and no nitrogen retention in the blood, and the microscopical examination of the kidneys showed considerable tubal damage with only slight changes in the glomerular and interstitial tissues. In the other three cases there were, in addition to the initial œdema, hæmaturia, increased blood pressure, and uræmia at the termination, and the autopsy revealed again lipoid degeneration of the tubules but also extreme changes in the glomerular and interstitial tissues. Dyke expresses the logical conclusion that the œdema in all these cases was connected with the tubal degeneration, and that the cardiovascular and uræmic manifestations were aroused by inflammatory reaction in the glomeruli; he also emphasises the view that the myelin kidney is only the extreme development of the lipoid degeneration invariably seen in the tubal tissue in cases of hydropiginous renal disease.

From the conception of "nephrosis," a purely degenerative renal lesion, by Müller in 1905, the recognition of doubly refractive lipoids in the myelin kidney by Kaiserling and Orgler in 1902, and the discovery of hypercholesterolæmia in renal œdema with albuminuria by Chauffard and Widal in 1911, have arisen the modern views concerning the condition now commonly described as lipoid nephrosis. These found their full expression in the work of Epstein, who in a series of papers[15-18] published between 1912 and 1920 focussed the attention of the English-speaking world upon cases of nephritis exhibiting an enormous daily loss of albumin in the urine, a reversal of the usual albumin-globulin ratio in the plasma, with reduction of the total plasma proteins, excess of blood-cholesterol, normal blood-urea and non-protein nitrogen, and no cardiovascular changes. Epstein emphasised the occurrence of apparently primary cases of this disease in young subjects, with no previous renal history, and mentions its chronic though apparently benign course, and the great benefit often observed by giving a diet rich in proteins, low in carbohydrates, and with no fat.

During the same period Munk[4] had, in Germany, gradually evolved a similar conception. He describes lipoid nephrosis as an insidious disease appearing in young persons, with œdema, intense albuminuria but no hæmaturia, oliguria, normal nitrogen excretion, normal blood pressure, excess of cholesterol in the blood, and doubly refractive lipoids in the urine. The course is very chronic, and on the whole benign. The only difference between the description given by Epstein and that of Munk would appear to be that the former lays emphasis on the alteration in the proportions of albumin and globulin in the plasma, whilst the latter stresses the occurrence of doubly refractive lipoids in the urine.

Observations on the cholesterol content of the blood in renal disease are not yet very numerous, but such as are accessible in the literature all seem to support

the original observations of Chauffard and of Widal. Thus, Stepp,[20] Strauss,[21] Daniels,[22] Schwarz and Kohn,[23] Hiller,[24] Elwyn,[25] Kollert,[26] and Murphy and Warfield,[27] have all published confirmatory observations, whilst the negative findings of Bloor[28] are an additional confirmation in that they were made entirely upon cases without œdema. It is significant to note that observations on cases of renal œdema without hypercholesterolæmia are conspicuously absent, and it seems reasonable to doubt whether such a condition can occur unless the œdema is merely due to cardiac failure following high blood pressure.

Our own observations on this point agree with those referred to above; typical examples are set out in Table I.

TABLE I.—*Cholesterol Content of Blood expressed in Milligrammes per 100 Cubic Centimetres.*

Nature of case.	Cholesterol.	Nature of case.	Cholesterol.
Uræmia.	142	Renal œdema.	517
	112		444
Chronic nephritis, nitrogen retention.	130		240
	140		227
	117		290

For comparison with Table I. we quote from our observations on certain other cases (Table II.).

TABLE II.—*Cholesterol Content of Blood expressed in Milligrammes per 100 Cubic Centimetres.*

Nature of case.	Cholesterol.	Nature of case.	Cholesterol.
Pernicious anæmia ..	97	Obstructive jaundice.	340
Diabetic coma ..	210		333
Cirrhosis of liver, no jaundice	131		308
Syphilitic cirrhosis, no jaundice	105		250
Addison's disease ..	78		305
Diabetes	127		359

Pure Lipoid Nephrosis.

The summarised account of the clinical and laboratory features of lipoid nephrosis which we have given above applies to what is sometimes called its pure or primary form. How often this occurs is still a matter of considerable doubt, but cases in children and young adults are certainly not infrequent. To fall into this category a case must have no history of scarlatina or other probable cause of renal inflammation, there must be albuminuria without hæmaturia from the outset, and œdema without cardiovascular change or uræmic manifestations at any time.

The following case, recently observed, may be placed in this class:—

CASE 1.—W. A., male, aged 22. Had suffered from measles, chicken-pox, and whooping-cough, without complications, during childhood. In 1923 had a slight attack of pleurisy. In 1925 had pyodermia. In August, 1926, during a holiday, he observed that his abdomen and legs were swollen. A few weeks later the face also swelled. He had transitory epigastric pain and diarrhœa. Nothing abnormal was observed as to his urine. Seen at the end of October, 1926, the face looked puffy. The legs and lumbar region were somewhat œdematous. There were ascites and evidence of bilateral hydrothorax. Blood pressure 140/90, heart normal. After two days in bed the blood pressure was found to be 110/70. Optic fundi normal. Urine, S.G. 1020, eight parts of albumin per 1000, a few hyaline and granular casts. No blood.

Blood analysis (milligrammes per 100 cubic centimetres): urea, 30; non-protein N., 29; uric acid, 3·6; chlorides, 479; cholesterol, 209. Wassermann reaction was negative.

Admitted to Middlesex Hospital under the care of Dr. C. E. Lakin, he was put on a diet of abundant protein and no fat. The urine was found to vary between ¼ and ½ litre per diem, the albumin loss amounting to 10 g. or more daily. Repeated examinations of the blood confirmed the normal nitrogen figures. The cholesterol at different examinations was found to amount to 209, 256, 266, 294 mg. per 100 c.cm. A chloroform extract of the urine gave a faint positive reaction for cholesterol. The sedimentation time of the red corpuscles was considerably diminished. The basal metabolic rate was 19 per cent. below normal. The urea in the urine was between 2 and 3 per cent., and after the administration of 15 g. of urea rose to just above 3, showing full normal concentrating power. During the first four weeks of treatment the œdema of the legs, face, and lumbar region disappeared; there was still slight ascites. The daily albumin loss remained high. Patient felt well. Observation continues.

This case exhibits the features of pure lipoid nephrosis—namely, absence of history, oliguria, profuse albuminuria, œdema, normal cardiovascular system, no nitrogen retention, hypercholesterolæmia, normal concentrating power of the kidney, low basal metabolic rate, diminished sedimentation time of the blood. The only doubt as to the absence of other factors lies in the fact that on two occasions traces of blood were present in the urine.

In addition to those of Epstein and Munk, the cases quoted by Schwarz and Kohn, Dyke, and Murphy and Warfield appear usually to have been examples of pure lipoid nephrosis. The paper of Murphy and Warfield is particularly interesting in that it describes the post-mortem findings in one of these "pure" cases; the changes in the kidneys were found to be almost entirely in the epithelium of the tubules.

Complicated or Secondary Lipoid Nephrosis.

But there is no doubt that lipoid nephrosis is often seen in cases where there has been an initial inflammatory disease of the kidney, usually of the glomerular type. And again it seems certain that many cases which are apparently a primary degeneration with characteristic albuminuria and œdema later become complicated by glomerular inflammation.

The following may be given as a case falling into this class:—

CASE 2.—B. M., female, aged 20. Measles at age of 2 years, "nephritis" at 6, recurring at 15. She was then admitted to hospital three times; details are unknown. In October, 1925, she was admitted to Middlesex Hospital under the care of Dr. R. A. Young. She had been well in the preceding March, but then began to swell in the face, abdomen, and legs. Vomiting set in and had continued intermittently.

On admission she had œdema, ascites, oliguria, and 20 parts of albumin per 1000 in the urine. The systolic blood pressure was 140 mm., but the heart was not enlarged perceptibly. Treated with a generous diet and urea administration, the œdema subsided rapidly and considerably, but on discharge she was still passing considerable amounts of albumin and the systolic blood pressure remained at 140. The urine never contained more than 1·5 per cent. of urea, even after urea administration. The Wassermann reaction was negative.

Examined 13 months later, patient was at work and feeling well save for occasional headaches. There was some œdema of the ankles, and she said that œdema had fluctuated considerably from month to month. Systolic blood pressure 140 mm. Considerable albuminuria.

The following are the results of blood analysis at various dates:—

	On admission.	Six weeks later.	Eleven weeks later.
Urea	32	94	58
Non-protein N. ..	32	63	51
Chlorides	541	556	—
Cholesterol	517	240	375

The nitrogen retention and raised blood pressure in this case point to glomerular and interstitial changes of serious degree, and make the prognosis correspondingly bad. The probable uræmic termination of complicated cases of this type may be illustrated as follows:—

CASE 3.—E. H., male, aged 16. Admitted to Middlesex Hospital May, 1923. There was no previous history save whooping-cough in infancy. On admission there was œdema of legs, face, and abdomen. Massive albuminuria, hæmaturia, normal cardiovascular system. Patient vomited on several occasions, but after a few weeks felt well. The œdema did not subside or respond to Epstein's diet. During the following months the œdema fluctuated, albumin passed amounted to from 8 to 20 parts per 1000. Headaches occurred, there was a steady increase in blood pressure, and nitrogen retention in the blood became evident. At the beginning of September, after a single convulsion, the patient became suddenly comatose and

failed to recover consciousness, in spite of hot-air baths, venesection, and lumbar puncture. He died in 36 hours.

	May.	June.	July.	August.	Sept.	P.M.*
Systolic b.p.	125	148	144	160–176	200	—
Blood-urea	28	55	55	—	—	54
Non-protein N.	27	49	45	—	—	73

* Post mortem.

The total albumin lost per diem appeared to bear some relation to the patient's general condition, being markedly increased during the final week.

Elwyn, whose recent paper is an important one, admits the occurrence of pure lipoid nephrosis, but appears to stress the frequency with which the disease is really secondary to an inflammation affecting the glomerular epithelium, and it is noteworthy that in the cases of Dyke there were always histological changes in the glomeruli, although these were far more conspicuous in those examples which had later developed high blood pressure and uræmia. It is certainly difficult to explain albuminuria of the massive type seen in these cases on any hypothesis save that of increased permeability of the glomerular epithelium, but it should be added that such increased permeability does not necessarily imply an inflammatory lesion. The occurrence of lipoid nephrosis secondary to an initial nephritis is, however, not questioned. It may here be recalled that in the early observations of Widal, Weill and Laudat several of the cases exhibiting œdema and hypercholesterolæmia were examples of tuberculous disease of the kidney.

Treatment of Lipoid Nephrosis.

Much of the interest aroused by the original publications of Epstein was due to the line of treatment of cases of chronic renal œdema there suggested. References in English literature by Galloway,[29] and by MacLean and de Wesselow,[30] dealt almost exclusively with this side of his work, the possibility of dietetic replacement of albumin lost in the urine being the factor which aroused attention rather than the correlation of the cholesterol excess, this latter factor being apparently little considered. Epstein's diet consists essentially in the replacement of carbohydrate as far as possible by protein and an entire elimination of fats.

In common with many other observers, we have seen occasional brilliant effects from this treatment, but it is generally agreed to-day that there is no uniformity in results, which are often disappointing; the first case we have quoted in detail showed great benefit, the second also exhibited great temporary relief in the degree of œdema, the third failed entirely to respond. In the last case this was probably due to the progress of glomerular change and nitrogen retention, but it must in general be admitted to-day that Epstein's diet is uncertain in its effects, although it has shown the frequent advantage of a generous diet in cases without signs of nitrogen retention.

A further interesting form of therapy in cases of lipoid nephrosis is the administration of thyroid extract. Eppinger[31] has shown that a lowered basal metabolism is frequent in this disorder, and considerable benefit is sometimes observed as the result of giving thyroid extract. The high doses tolerated by most patients is indirect evidence in favour of such treatment.

The administration of urea by mouth appears to be rational if blood analysis at repeated intervals shows that there is no nitrogen retention.

Some Unsolved Problems.

In the space of the present paper it is impossible to deal adequately with the many important problems that arise from consideration of the phenomena of lipoid nephrosis.

The mechanism of the œdema is, perhaps, the chief of these. Abandoning the classical theory of salt retention, Epstein has endeavoured to explain this on the basis that the profuse albuminuria causes such loss of plasma albumin that water is drawn from the blood stream to the tissues by the force of osmosis Elwyn has more recently put forward the view that the body endeavours to check the albumin-loss in the urine by diminishing the urinary flow, and that the consequent tendency to an increased blood volume is then corrected by the passage of water into the tissues; this ingenious hypothesis seems to lack experimental support.

The second outstanding problem is the significance of the hypercholesterolæmia. Does it appear from the outset, or is it only apparent after albuminuria and œdema have been prominent for some time? Of its intensity there seems to be no question; indeed our personal observations and those of many others who have inquired into the subject seem to point to the cholesterol excess in lipoid nephrosis being greater than in any other common disease save possibly obstructive jaundice. In a few cases of transient œdema of renal origin in gravid women we have found a blood cholesterol within the high limits usually observed in pregnancy, but we have not been able to trace record of any cases of chronic œdema in renal disease, apart from cardiac failure, in which a normal or low blood-cholesterol has been found after repeated examination.

The prognosis in these cases is a further obscure point. A certain number appear to make a rapid and complete recovery, but the vast majority become chronic, although the œdema appears to wax and wane considerably. Their very chronicity is the chief reason why complete records are relatively scarce, the general hospitals are unable to house them indefinitely, and they pass out of observation. A considerable number become complicated by nephritis and die in the typical manner of renal failure, in uræmic coma. But many others appear to terminate with a low-grade peritonitis which certain German authorities believe to be pneumococcal.

Lastly, a word must be said concerning the macroscopic appearance of the kidneys in these cases. Is it not time that the story of the large white man with the large white kidneys were abandoned? There is no uniformity in the naked-eye appearance of the kidneys seen in autopsies on patients dying with lipoid nephrosis, but it seems certain that kidneys which are large and white are somewhat unusual. The matter is, perhaps, unimportant, but we mention it because it has for years distracted attention from the findings of the laboratory and the microscope, which are probably of much greater import to the clinician.

We wish to express our thanks to Dr. Young and Dr. Lakin for permission to publish certain observations on cases under their care. Expenses incurred in this inquiry were partially defrayed by a Government grant made on the recommendation of the Royal Society. This paper forms part of a report to the Medical Research Council.

Summary.

1. Apart from albuminuria, it is difficult to demonstrate any clinical evidence of renal disorder in the dropsical type of "nephritis."

2. On account of the paucity of clinical and microscopical evidence of inflammation in many of these cases they are frequently spoken of as examples of "nephrosis" rather than "nephritis."

3. Hypercholesterolæmia has been shown to be a conspicuous feature of these cases, in sharp contrast to those with uræmia and cardiovascular changes, where the cholesterol content of the blood is usually normal.

4. The "myelin kidney" is probably the extreme development of the common anatomical change in this condition, which in milder cases exhibits itself merely as lipoid degeneration of the renal tubules.

5. Examples are given of the cholesterol content of blood from these and other diseases.

6. Cases are detailed (*a*) in which there was apparently pure lipoid nephrosis, and (*b*) in which this condition was complicated by nephritis, nitrogen retention, and uræmia.

7. The most promising treatment at present is by the "Epstein" diet and thyroid administration.

8. The mechanism of the œdema and the significance of the hypercholesterolæmia in these cases cannot at present be explained.

9. These cases are almost invariably chronic, death is usually due either to a low-grade peritonitis or to urræmia as a complication.

10. The "large white kidney" is not a common finding at autopsy.

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SERUM PROPHYLAXIS IN MEASLES.

AN EVALUATION OF THE RESULTING IMMUNITY.

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THE writer has recently attempted the control of an epidemic of measles on rubber estates in the Federated Malay States by inoculation of the children en masse with serum from convalescent cases. A description of the method employed and a critical survey of the immediate results will, in due course, be communicated to the medical press. But some months after a number of plantation outbreaks had thus been brought to a close morbilli reappeared on three of the seven estates on which serum prophylaxis had been practised. Comparatively little is yet known of the degree and duration of the passive immunity conferred by this mode of protection, and it is therefore proposed to record some observations on these points in the present paper.

Immediate Results of Serum Prophylaxis.

The immediate results achieved with 395 children are summarised below. Groups numbering 93, 132, 50, and 120 children were given 2, 2·5, 3, and 3·5 c.cm. of serum respectively. During the seven weeks following inoculation the incidence in these groups was 15 per cent., 4·5 per cent., 14 per cent., and 1 per cent. Cases continued among adults and uninoculated children after the last cases in the inoculated groups on all the estates, so that opportunity for infection was not lacking. Yet there were not more than 28 cases among the 395 children, and only six of these developed the rash after an interval of ten days had elapsed from the date of inoculation. The average incubation period may be taken as ten days, and the rash of measles usually appears on about the fourteenth day after infection, but when serum is given, many instances have been recorded in which the incubation period has been considerably lengthened. If this factor be ignored, 22 of the failures probably received serum on or after the fifth day of incubation, and when serum was given in doses varying from 2 to 3·5 c.cm. before exposure or during the first four days of incubation the failures were only 1·6 per cent.

Duration of Passive Immunity.

A period of from one to three months has been cited by various investigators as the duration of the transient immunity which follows the inoculation of convalescent serum. McNeal (1922) has reported an infection two months after protection, and v. Toobay (1921) three cases between the seventy-second and seventy-fifth day. Duration will necessarily depend on antibody content and dosage of the serum, but the following instances which have occurred in the writer's series indicate that immunity may continue for considerably longer periods:—

1. During the first week of November, 1925, 93 children belonging to estate No. 1 were inoculated with 2 c.cm. of plasma from convalescent cases. Fourteen of these developed measles, the last case occurring on Nov. 19th, though cases continued among the adult coolies until Nov. 27th. In a small control group of ten uninoculated children on this estate eight became infected. Thus 79 inoculated and two uninoculated children escaped. On March 31st, 1926, two new coolies from India arrived on the estate. They had been quarantined for cholera at the F.M.S. Quarantine Station before admission to the country, but it is the practice of the estate medical officer to isolate all new coolies on the estate for an additional six days when there is a history of recent contact with cholera cases. These men were not therefore allowed in the coolie lines until April 6th. They then mixed freely with the estate coolies and children, and on the afternoon of April 8th both were admitted to hospital with typical measles eruptions. In both instances the disease ran a mild course. All the estate children were examined for measles daily until April 23rd, but no fresh cases were reported, although the inoculations had been done some five months previously.

2. On Division A of estate No. 3, 62 children were inoculated with 2·5 c.cm. of serum on Nov. 14th, 1925, 16 being kept as controls. During the three weeks following there were five cases among the inoculated children and three in the control group. The numbers of inoculated and control children who escaped were therefore 57 and 13 respectively. On March 11th, 1926, measles reappeared among the adult coolies of the division, and up to April 20th this secondary outbreak involved 13 cases, including three (5 per cent.) in the inoculated group and two (15 per cent.) among the controls. The cases were all of a mild nature. It thus appears that some residual protection was operative in a percentage of the children four and a half months after inoculation.

3. A secondary outbreak of measles also occurred on estate No. 6, but in this instance the writer can only quote hearsay evidence, as he had, in the meantime, been transferred to Singapore. The inoculation of 75 out of 107 children on Dec. 26th, 1925, with 3·5 c.cm. of serum was followed by one further case in each group. Cases in the following June numbered about 20, but only one or two of the inoculated children are said to have become infected.

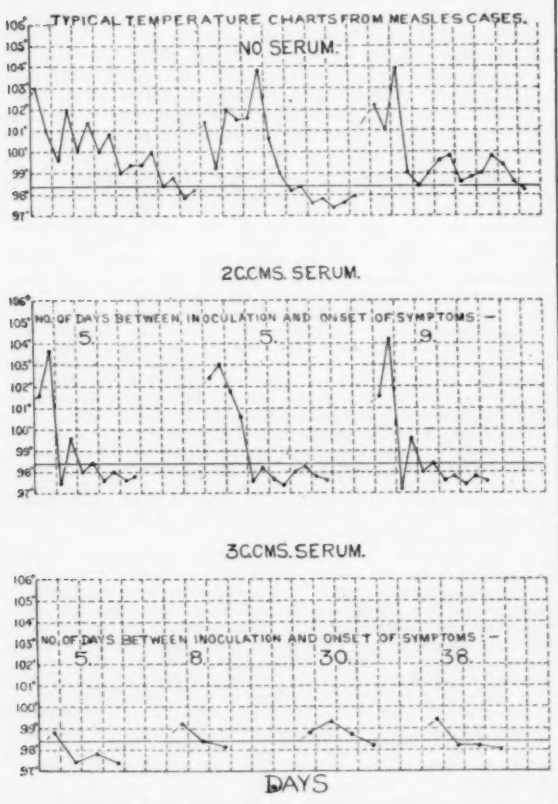
Attenuated Measles.

The introduction of serum prophylaxis was followed by the observation of a striking modification in the course of the disease when such treatment was given in the later stages of incubation. Under these circumstances the malady is not aborted, but the incubation period may be increased, and the character of the disease is rendered so mild that complications and serious sequelæ are but rarely seen. Attenuation has also been noted in the few instances of the present series, where serum, although given some time before infection, failed to protect, and the rash developed three weeks or more after inoculation.

Of the 28 cases which developed measles within seven weeks of treatment, all but one of the children had very mild attacks. The exception was a child

aged 3 years, on whom the rash appeared seven days after the injection of 2 c.cm. of plasma. Broncho-pneumonia supervened, but the course was comparatively benign, and the little patient was discharged from hospital 14 days after admission. A contributing cause of this complication was probably the migration of ascaris larvæ through the lungs. On two control estates 13 children had serious complications, and six died among 69 cases.

The cases of modified measles observed by the writer have been characterised by a comparative absence of catarrhal symptoms. This probably greatly reduces the infectiousness of such cases. The rash has been faint, with individual macules almost discrete, and the abbreviation in the course is well illustrated by the temperature charts reproduced on the accompanying figure. Records are only available from the



time of the onset of the rash, as the coolies ignore symptoms of invasion, and only report sick on the appearance of the eruption. The upper part of the figure shows three charts typical of the febrile course in a large number of untreated children. Beneath this are three charts from children who had been inoculated with 2 c.cm. of plasma, and developed the rash 5, 5 and 9 days afterwards. The initial temperatures of these cases were as high as those of the controls, but defervescence was complete by the third day. Four temperature charts are given on the bottom of the figure from children who received 3 c.cm. of serum and had symptoms of measles 5, 8, 30, and 38 days later. The maximum temperature noted in this group was 99·9° F. and by the second day all the cases had become normal.

This attenuation of the disease following serum administration may be employed as a basis for estimating residual protection in cases which develop measles some months after inoculation. Reference has already been made to the secondary outbreak which occurred on Division B of estate No. 3, four and a half months after the majority of the children had been protected. All the cases were very mild but the difference in the temperatures is seen below:—

—	Case No.	Age (in years)	Rash appeared on.	Maximum temperature.	
				First day.	Second day.
Inoculated children.	1	2½	26/3/26	98·6° F.	Normal.
	2	9	1/4/26	98·6° F.	,,
	3	1	16/4/26	98·4° F.	,,
Controls.	1	2	27/3/26	100° F.	Normal.
	2	1½	1/4/26	99·8° F.	99·0° F.

The initial temperature in the two controls was thus over a degree higher than in the three inoculated children and this fact, taken in conjunction with the higher incidence among the control cases, indicates that a degree of immunity was still operative.

Commentary.

In areas where measles appears from time to time in epidemic form, inoculation of the children with convalescent serum is a useful method for controlling the disease. This is particularly the case when the population is grouped in small communities as on plantations or in villages. With a dosage of 3·5 c.cm. of serum, a large percentage is protected, and, if measles supervene, the disease is attenuated even after an interval of four and a half months has elapsed.

But for endemic areas such as Europe and North America, this prophylactic measure cannot be considered suitable. Immunity transmitted from mother to offspring disappears between the sixth and twelfth months of life, and some 80 per cent. of the deaths from measles occur during the first four years. Protection which does not endure for about four years cannot, therefore, be of great value under urban conditions where opportunity for infection is almost continuous. This period can only be covered by the conferring of an active immunity.

The problem is immensely important in these days of falling birth-rates, for the annual death roll from measles approximates to 100,000 in European countries. Bernard (1925) has observed that the mortality-rate is falling less rapidly than for scarlet fever and whooping-cough. Little improvement can therefore be anticipated in this appalling loss of infant life until effective prophylaxis is actively employed. A method which will protect during the first four years of life could save some 80,000 lives anually in Europe alone.

Débré and Ravina (1923) have introduced an ingenious means of established active immunity. They inject convalescent serum during the later stages of incubation thus causing attenuation of the disease. The consequent comparative absence of coryza renders such cases much less dangerous to the child community, while the resulting immunity should endure throughout the danger period of early life. But the coryza of the invasion period or the onset of the rash is only too frequently the first intimation of infection. It is in a very small number of cases that the date of exposure is known, and injections can be given at the critical time.

In the opinion of the writer a temporary solution of this problem in immunisation for endemic areas has been found by Nicolle and Conseil (1923). These workers suggested that active immunity could be best achieved by the use of convalescent serum followed 24 hours later by a small injection of blood from an acute measles case. Experimental work should be directed to the determination of the optimum dosage of serum and virus, but when the day arrives that the measles virus can be cultured with certainty, the method will probably give place to a single inoculation of virus and artificially prepared immune serum.

(*References at foot of next page.*)

A CASE OF OSTEOGENESIS IMPERFECTA.

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(WITH COLOURED PLATE.)

THE purpose of this communication is, first, to record an interesting case, and, secondly, to urge the necessity of full chemical and pathological investigations into similar cases in view of the discovery that potent extracts of bovine parathyroids cause considerable excretion of calcium from the bones.

Clinical History.

T. G. S. a youth aged 17. There was no history of fractures, blue sclerotics, deafness, nor a peculiar shape of the head in grandparents, parents, or brothers and sisters. The patient is the ninth of 11 children. Three of these died as babies either of pneumonia or in convulsions. The mother had two miscarriages.

He was a full-term baby and the labour was easy. At birth he weighed 8 lb. and was a "fine, healthy baby" with no deformity of any sort. The blue sclerotics were noticed a few days after birth. He was breast-fed until nine months and was then given Nestlé's milk and barley water. At 12 months he was given crusts, and subsequently a similar diet to the rest of the family. He had his first tooth at 9 months, and began to talk at 18 months. He did not crawl as a baby and has never walked. The "opening in the head" closed between the third and fourth year. He had measles and chicken-pox as a child, but otherwise, except for fractures and dislocations, he has been "very healthy." The second dentition began to appear at 10 years. He attended an L.C.C. special school for cripples from the age of 10 to 17. He learned to read and write quite well. He can stand only if he holds on to something, and even then he is very unsteady. He slides about the house on his buttocks, and gets upstairs on his hands and knees.

History of Special Condition.

1. At birth there were no fractures and, as far as can be ascertained, the head was normal.

2. At three weeks the right humerus was fractured while the mother was lifting him from his bath. It was placed in splints and apparently united well in a few weeks.

3. At 5 months he was admitted to the London Hospital under the care of Mr. P. Furnivall. His brother had slipped while carrying him and had broken his left femur without actually dropping him. The fracture united after treatment for three weeks in a gallows splint.

4. Between 18 months and 2 years "the left leg was broken three times." These fractures were treated at home by the application of bandages.

5. At 3 years he was again admitted to the London Hospital under the care of Mr. P. Furnivall, when the diagnosis "osteogenesis imperfecta" was made. Apparently he had been sent to a home in the country where, according to the mother, "the nurses were very careless and broke three of his bones." He had subperiosteal fractures of the right femur, right humerus, and right ulna. An interesting statement appears in the house surgeon's notes that "the head is hydrocephalic and the anterior fontanelle admits the little finger." The Wassermann reaction was negative. "The bones united soundly" after immobilisation for six weeks.

6. At 6 years he was admitted to the London Hospital under the care of Mr. T. H. Openshaw. He then had a subperiosteal fracture of the right femur which united in two weeks.

7. At 11 years he was admitted to the Mile End Hospital with a fracture of the right forearm.

8. At 13 years he "put out the left shoulder." From his own description there is little doubt that this was a dislocation of the joint.

9. He states that at 14 years some one fell over him in the dark and "put out both hips and the right collar bone." From his description it seems likely that he dislocated the left hip, but fractured the right femur and the right clavicle. Following this accident he was in bed for three months.

10. At 17 years he was twice admitted to the Mile End Hospital under the care of Dr. J. I. P. Wilson and Dr. C. D. Coyle, who kindly gave me permission to transfer him to the London Hospital. On the first occasion, according to the mother, "he was trying to stand in the garden when the wind blew him down." He fell on his outstretched hand and broke his left forearm in three places. On the second occasion he caught his left foot under a chair and, in attempting to withdraw it, fractured the left femur. The left thigh was placed between sand-bags, and the fracture united in five weeks. After admission to the London Hospital, while raising himself in bed on the outstretched left hand, he broke the left radius. This was a subperiosteal fracture associated with little pain and no displacement.

It is difficult to obtain exact information as to the total number of fractures. The mother thinks he has broken his bones "more than 30 times." The bones of the right arm and leg have been more often fractured than those of the left. In his early childhood he was much more liable to fractures than later, and the mother states that "at one time when you lifted him you could hear his bones crack and he would cry out with pain." Since the age of 10 years he has fractured his bones much less frequently. With the exception of two falls on the face, in which he broke his nose, the fractures have been produced without violence. They often occur "when his brothers are a little rough with him." Pain is certainly associated with the fractures, but it is neither severe nor prolonged. The information with regard to dislocations is less trustworthy, but apparently "five or six" dislocations, usually involving the right shoulder but sometimes the left hip, have occurred.

Examination.—A slightly pale, ill-nourished, dwarfed, deformed boy of normal intelligence. His total height is less than two-thirds that of a normal control. He is unable to walk and stands only with difficulty.

Table Showing Weight and Measurements.

	Patient.		Control of same age.
Weight in kilogrammes	24·4	.....	61
Pelvimeter measurements, in cms.—			
Biparietal diameter	14	.....	15
Diameter 1 cm. in front of ears and 4 cm. below parietal eminence	*15·5*	.....	14·5
Occipito-frontal diameter	*20*	.....	18·5
Root of nose to base of occiput	15	.....	17
Between malar bones	10·5	.....	11·5
Root of nose to tip of chin, with mouth closed	10	.....	11·5
Intercristal diameter	21	.....	26·5
Measurements by tape measure, in cms.—			
Total height	105	.....	170
Sitting height	52	.....	82
Circumference of head:			
At parietal eminences	*55*	.....	54·5
Just above ears	50	.....	53·5
Through root of nose and occipital protuberance	*57*	.....	54
Circumference of chest at nipple line	69	.....	88
Circumference of abdomen at umbilicus	61	.....	68
Circumference of neck	26·5	.....	34

	Right.	Left.	
Length of upper limb	55	61	76
" upper arm	21	25·5	30
" forearm	19	20·5	25
" hand	15	.....	21
" lower limb	62	68·5	104
" thigh	25	33	47
" leg below knee	21·5	24	37
" foot	17	.....	25

Skull.—The vault of the skull is flattened as if from a weight applied above. The occipital bone makes an angular protrusion which is continued forwards, making a wide horizontal ridge from ear to ear. There is bilateral temporo-parietal protrusion of the skull, very evident on the right side. This supra-aural enlargement bends the right ear, and to a less extent the left, outward and downward. There is no abnormal protrusion of the frontal region. The deformity of the skull is so extreme that, whereas every other measurement in the body is much less than that of a control, the bi-temporal and occipito-frontal diameters, together with the corresponding circumference, are actually much greater. The bones of the skull appear firm and of normal thickness, the fontanelles are closed, no sutures are palpable, and no craniotabes is found.

Jaws and Teeth.—There is slight protrusion of the lower jaw so that the lower teeth are opposite the upper. Owing to deformity of the lower jaw there remains a slight gap between the incisor teeth when the molars meet. The teeth are regularly spaced and, except for two carious molars, they are sound.

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Eyes.—The orbits are shallow, giving prominence to the eyes. Their horizontal axes slope downwards and outwards so that the outer canthus of the eye, especially on the right side, is lower than the inner canthus. The sclerotics are a uniform grey-blue of moderate intensity. The irides are ill-formed, with poor striation and a dull grey colour. The fundi are normal.

Face and Neck.—The face is flat, though the bridge of the nose is well formed. There is some degree of asymmetry owing to mal-union of the nasal septum, from which a spur of cartilage projects into and partly obliterates the left nostril. There is scanty hair on the upper lip, but none on the face. The neck is short. The thyroid gland is normal in size and consistency.

Nervous System negative. There is no defect of hearing.

Spine.—There is severe lower dorsal scoliosis with the convexity to the right. He can sit up without difficulty, but the sitting height is little more than half the normal.

Thorax.—The thorax is short and broad. There is considerable deformity of the sternum and ribs; a broad, triangular, beak-like projection of the chest wall, commencing at the level of the nipples, protrudes downwards and slightly forwards over the epigastrium. The apex of this projection is formed by a buckling of the sternum at the level of the fifth costal cartilage. There is no enlargement of the costo-chondral junctions. Axillary hair is absent.

Heart and Lungs negative. No change is detected in the arteries. The blood pressure is 135/95 mm. Hg.

Abdomen.—The abdomen is normal in contour. No abnormality is detected on palpation. The external genital organs are well developed: the pubic hair is normal.

Extremities.—All four limbs are deformed, the right being more affected and shorter in length than the left. The thighs, forearms, and right tibia show anterior bowing. There is outward twisting of the shafts of the long bones of the lower limbs, so that the feet are extremely everted. Angular deformities and palpable callus are absent. There is no enlargement of the ends of the long bones. The proximal bones of the right upper and lower limbs are disproportionately short compared to the distal bones; there is no such disproportion on the left side. There is some limitation of extension of both elbow-joints, worse on the right side. Elsewhere the joint ligaments are lax, so that the range of movement of the shoulders, hips, wrists, and ankles is abnormally wide. The muscles are hypotonic. The hands and feet are short but are not otherwise deformed. (For clinical discussion see Bronson[1]).

Urine normal.

Blood Count.—Red cell count, 4,900,000; hæmoglobin, 75 per cent.; colour-index, 0·7; white cell count, 5240; polymorphs, 60 per cent.; eosinophils, 1·5 per cent.; small lymphocytes, 27 per cent.; large lymphocytes, 8·5 per cent.; large hyaline cells, 2·5 per cent.; basophil cells, 0·5 per cent.

Wassermann Reaction in Blood negative.

Blood-urea, 0·039 per cent.

Glucose-tolerance Test.—Fasting blood-sugar=0·091 per cent. 50 g. glucose by mouth. Blood-sugar, after 45 minutes, 0·105 per cent.; after two hours, 0·083 per cent.

Serum Calcium, 10·3 mg. per 100 c.cm.

Inorganic Phosphate in Serum, 3·8 mg. per 100 c.cm.

Calcium Output.—The calcium output was estimated in the urine and fæces over a period of nine days, during which the patient was kept on a weighed diet of known low calcium content. The energy value of this diet was 1150 calories daily. During the nine days distilled water was used in the preparation of all his food and drinks. The fæces were divided into three-day periods by the oral administration of 0·3 g. of carmine alum lake every third day. The urine was obtained in 24-hour specimens. I am indebted to Dr. P. Morton for some of the analyses. The record of the calcium exchange is tabulated below, the figures being milligrammes of Ca per three-day period.

Record of Calcium Exchange.

Three-day period.	Intake.	Output.			Balance.	
		Fæces.	Urine.	Total.		
	mg.		*Patient.*			
I.	153	283	349	632	−479	
II.	153	183	293	476	−323	Average
III.	148	122	240	362	−214	−269 mg.
			Control.			
I.	132	248	110	360	−226	
II.	95	352	37	389	−294	
III.	268	444	41	485	−217	Average
IV.	251	207	170	377	−126	−256 mg.
V.	256	369	190	559	−303	
VI.	278	508	110	618	−340	

The control was a male patient of 19, weighing 61·8 kg. and observed under similar conditions as to diet.

On such a low calcium intake there is, of course, a negative calcium balance. Discarding Period I. in both patient and control, it is found that the calcium balance is similar in both cases (patient −269 mg., control −256 mg.). It is realised that there may be fallacies in the experiment, since on the one hand the calcium intake was so inadequate, and on the other the dwarfing of the patient made it very difficult to devise satisfactory control observations.

Radiological Report.

I am indebted to Dr. M. H. Jupe for the radiograms and for the following report.

Skull.—The vault appears too large in proportion to the bones of the face. The distance between the tables is reduced so that the bones appear thinner than normal. This is especially noticeable from the bregma to the region of the lambda at which point there is an angular projection. From here the occiput sags downwards considerably. There is also loss of prominence in the frontal region of the skull. The structures forming the base of the skull appear to be flattened in their vertical dimension. This probably accounts for the lack of prominence of the mastoid shadows, and for the slight shallowness of the sella turcica which in other respects appears normal.

Long Bones.—All the long bones show shortening and bowing. The shadows of the bones are hardly more dense than those of the surrounding soft tissues. There is very great thinning of the cortex, more noticeable on the convex side. The spongiosa both of diaphyses and epiphyses is extremely faint, so that in places the normal pattern cannot be discovered. The epiphyseal lines appear normal. There is very little evidence to indicate the sites of the old fractures. However, in the region of the lesser trochanter of the right femur there are two fine transverse lines of comparative sclerosis running parallel. There is nowhere evidence of the formation of callus nor of periosteal new bone. There is no suggestion of cyst formation.

Ætiology.

There have been almost as many theories to explain the process at work in the bones as there have been observations. Many of these are based on histological evidence. Most authors have found a decrease in the osteoblasts with defective production of osteoid tissue.[2 3] Schuchardt [4] postulated defective periosteal ossification (periosteal dysplasia) to explain the thinning of the corticalis. Scheib [5] and Harbitz [6] thought that there was both excessive resorption of bone and halisteresis. Most authors agree that the epiphyseal cartilages are normal. Bauer [2] claimed that the calcification of cartilage and of osteoid tissue was normal as seen in histological sections. Harbitz,[6] however, thought the zone of provisional calcification abnormally thin and in places absent.

None of these suggestions bears on the underlying cause of the disease. Bauer [2] suggested deficiency or lowered vitality of all tissues of mesoblastic origin and showed histological abnormalities in bone, cartilage, and tooth pulp. Jansen,[7] on the other hand, suggested an embryonic defect due to abnormal amniotic pressure.

The glands of internal secretion have been suspected. Nicklas [8] and Bauer [2] both report cases with congenital goitre found at autopsy. However, it is open to question whether the fœtal thyroid functions, and hence whether it can cause a disease which begins in utero. Meissner [9] described two cases in young girls, one with premature and the other with abnormal sexual development. The findings of Malcolm [10] that, in dogs, administration of fresh pituitary substance by mouth caused an increased output of calcium, led Klose [11] to suspect the pituitary. There are two cases recorded which show definite enlargement of the parathyroids. The seven-months fœtus described by Bauer [2] had four enlarged parathyroids, the largest the size of the adult gland (3 mm. diameter). Histologically these showed hyperplasia. He relates that Dietrich [12] described another case.

Chemical Findings.

Observations on the inorganic constituents of the bones are scarce. In 1857 Barker [13] found that the bones in a congenital case yielded 33·3 per cent. of ash, while Regnard, quoted by Enderlen,[14] found

Plate showing blue sclerotics.

Plate showing deformities.

W. T. S.

A CASE OF OSTEOGENESIS IMPERFECTA.

(DR. DONALD HUNTER.)

Osteogenesis Imperfecta: Radiogram of Skull.

Tibia and Fibula.

Radius and Ulna.

Hip-joint and Femur.

24 per cent. of ash. Normal bones examined by Enderlen yielded 68·5 per cent. of ash.

The blood calcium and phosphorus were determined by Flagstad, Zanger, and Leven [15] in three cases and found to be normal. In the case here recorded the findings were normal. Schwarz and Bass [16] and Bookman [17] found calcium retention slightly decreased in cases of the congenital type of the disease. From observations on a child of 7 lasting over more than two years Schabad [18] concluded that there was increased loss of calcium and a corresponding loss of phosphorus in osteogenesis imperfecta.

In the case here recorded there was no increased loss of calcium compared to a normal control. However, our patient is ten years older than the oldest case described above, and it is conceivable that as the tendency to fractures becomes less the calcium exchange becomes more nearly normal. There is a large and increasing amount of evidence that further investigations of the blood chemistry, metabolism, and morbid anatomy of this disease, and especially of the younger cases, may be rewarded with some success. This evidence concerns the function of the parathyroid glands and is partly physiological and partly pathological.

Physiological Considerations.

The exact mode of action of the parathyroid hormone is unknown. However, it has been established in dogs and in man that active extracts of the parathyroid glands cause considerable excretion of calcium from the bones.

The pioneer work was done by MacCallum and Voegtlin, [19] who found a reduced calcium content in the blood-serum of dogs after parathyroidectomy. This observation has since been abundantly confirmed, but their statement that such dogs showed an increased excretion of calcium has not been corroborated. Thus arose the erroneous idea, to which Salvesen [20] later contributed, that parathyroidectomy was associated with a lowered threshold for the excretion of calcium by the intestines. It was supposed that the resulting drain on calcium kept the blood-serum calcium at a low level. Greenwald and Gross [21 22] have demonstrated that the true conception of the relation of the parathyroid glands to calcium excretion is the very reverse of that stated above, for their dogs after parathyroidectomy actually showed a *decrease* in the excretion of calcium. A direct means of settling this vexed question appeared when the work of Hanson,[23] Berman,[24] Collip,[25] and Hjort, Robison, and Tendick [26] made available a potent extract of bovine parathyroids.

Thus, in a further series of experiments, Greenwald and Gross [22] injected normal dogs with Collip's parathyroid extract and found that the increased concentration of calcium brought about in the blood-serum was followed by an *increase* in the excretion of calcium in the urine and fæces. Similarly, during certain investigations on lead poisoning Hunter and Aub [27] showed that, in five patients out of six, Collip's parathyroid extract (Eli Lilly) caused marked elevation in the blood calcium. In all six patients calcium excretion in the urine and fæces was very considerably increased. Thus, in the accompanying chart is shown a metabolism experiment on one of our patients extending over a period of six weeks. Collip's parathyroid extract was given by intramuscular injection in increasing doses and the blood calcium was thereby raised from 9·5 to 14 mg. per 100 c.cm. The effect of the calcium output can be judged from the chart. In the urine this was increased from 0·05 g. to 0·75 g. per three-day period. Though the effect was less marked in the case of the fæcal output, the total result was to increase the negative calcium balance *three-fold*.

We maintain, as, indeed, did Greenwald and Gross in dogs, that this increased calcium excretion occurs at the expense of skeletal deposits of calcium.

Pathological Considerations.

The physiological observations quoted above gain in interest when we consider the large number of cases reported in the literature where parathyroid tumours are associated with one or other of the so-called "malacic diseases" of bone. Erdheim [28] was the first to point out enlarged parathyroids in cases of osteomalacia. Hoffheinz,[29] rejecting all cases where the enlargement of the parathyroids was indefinite or inadequately described, collected from the literature 45 cases with *measurable* enlargement of one or more parathyroids. Of these 27 were associated with definite bone disease, including 17 of osteitis fibrosa,

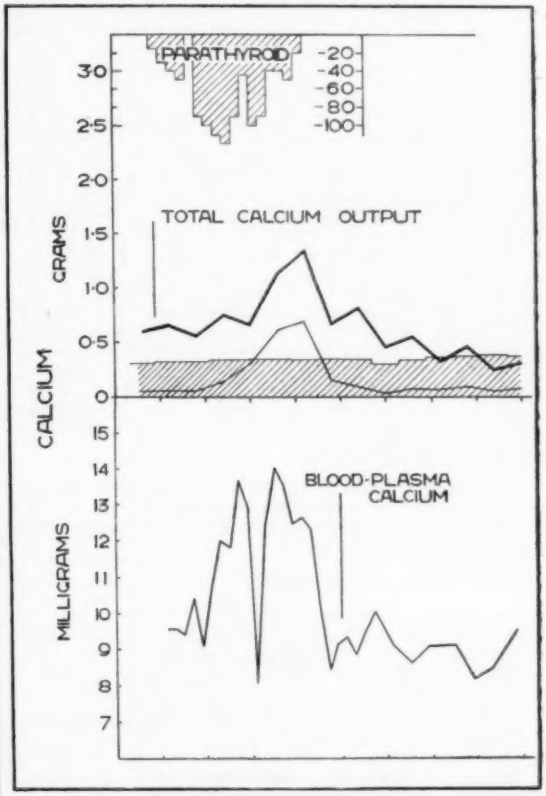

Chart showing the effect of parathyroid extract on the blood calcium and on the calcium excretion.

The interval marks on the abscissa represent five days.

In the upper portion of the chart the upper block represents treatment with parathyroid, the adjacent scale indicating units per day. The lower blocks represent the calcium intake in three-day periods. The faint line represents the excretion of calcium in the urine expressed in output for three days. The heavy line is the total excretion of calcium in urine and fæces for three-day periods. The distance between heavy line and blocks, therefore, represents the positive or negative calcium balance.

In the lower portion of the chart is shown the blood-plasma calcium.

eight of osteomalacia, and two of rickets. Sometimes more than one parathyroid gland was affected. He quoted increases in size up to 4·5 by 2·1 by 1·2 cm. The histological change was usually a hyperplasia. Dawson and Struthers [30] have described a case of osteitis fibrosa with a parathyroid tumour the "size of a walnut." Gödel [31] has published a case with the clinical appearances of osteitis fibrosa, in which at a partial autopsy he found two parathyroid tumours, one measuring 10 by 2 cm., and the other 5·4 cm. diameter. Lastly, Mandl [32] published a case of osteitis fibrosa in which the daily excretion of calcium in the urine was 54 mg. Removal of a parathyroid tumour (2·5 by 1·5 by 1·2 cm.), which Erdheim and Maresch thought was probably malignant, was followed by a fall in the daily excretion of calcium in the urine to 7·6 mg., and by improvement of the clinical condition. The blood calcium was not estimated before operation (personal communication).

Without further evidence it is unjustifiable to assume that these tumours are primarily responsible for the changes in the bones. However, the possible occurrence of parathyroid hyperfunction must be borne in mind and investigators should endeavour to elucidate this point.

In order to do this we would suggest the following investigations in all suitable cases: (1) Estimation of the calcium and inorganic phosphate in the blood-serum. (2) Estimation of the total output of calcium and phosphate in a series of controlled periods where the intake is known accurately. (3) In autopsies the anatomical and histological examination of the glands of internal secretion paying special attention to the parathyroids.

Summary.

A case is recorded of osteogenesis imperfecta associated with blue sclerotics. The family history is negative. Corresponding to the early onset at three weeks there is dwarfism and deformity of the skull. The long bones have been fractured at least 30 times without violence, the left tibia alone escaping. Radiograms show the classical shape of the skull; the long bones are short and bowed and show an extremely thin corticalis and faint spongiosa. The blood-serum calcium and inorganic phosphate are normal. The total excretion of calcium on a known low calcium diet is the same as in a normal control. The effect of Collip's parathyroid extract in raising the blood calcium at the expense of skeletal calcium is discussed. Reasons are given in support of a more complete inquiry into the calcium and phosphorus metabolism in cases not only of osteogenesis imperfecta but also of osteitis fibrosa.

My thanks are due to Lord Dawson for allowing me to investigate and to publish this case, to Mr. W. T. Shiells for the drawings, and to Mr. H. J. Suggars for the prints of radiograms.

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GASTRO-DUODENOSTOMY.

FURTHER EXPERIENCES.

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IN THE LANCET (1923, ii. 508) I reported a series of 53 cases of chronic duodenal ulcer, in 50 of which I had done gastro-duodenostomy; in the other three I did posterior gastro-enterostomy; in two, owing to dense adhesions, and in the other because a large inflammatory mass around the ulcer made it unwise, in my opinion, to attempt the former operation. I have continued practising the operation, and now wish to report a series of close on 200 cases.

Points in Technique.

I repeat that it is quite easy to mobilise the duodenum in practically every case. In the last series I have done gastro-enterostomy in six cases, twice because the pancreas completely surrounded the second part of the duodenum, twice owing to extensive adhesions, and twice because I had to remove the gall-bladder at the same time and was afraid the gastro-duodenostomy anastomosis might be caught up in the scar of the gall-bladder bed. In all the other cases mobilisation of the duodenum was easily accomplished.

One detail in the technique I believe to be important and that is to free the angle between the second and third parts of the duodenum, where it turns to the left to cross the spine; it is better to free this end of the second part rather than the upper angle, where the first and second parts meet, as at this point there are often very embarrassing vessels.

As for the rest of the technique, it is much the same as that of gastro-enterostomy, except I do not use a clamp on the duodenum, and I do not stitch the gastric mucosa. Dragstedt has shown that in dogs one of the most satisfactory methods of establishing an experimental peptic ulcer in the pyloric portion of the stomach is to insert sutures in the mucosa; ulcers are much more difficult to create nearer the cardia. In case there should be anything in this applicable to man I release the stomach clamp after suturing the peritoneum on the posterior side of the anastomosis, and after opening the viscera, secure the obvious vessels and then carry the needle for the second row of sutures down to, but not through, the mucosa. By omitting the duodenal clamp I have been able to make one or two interesting observations. One can pass a finger into the duodenum and feel the ulcer crater in some cases, and this helps one to be sure that the cautery (used to destroy the ulcer) is applied accurately to the base of the ulcer. Done from the outer side alone this is not always such an easy thing to be sure of. A second point has reference to suturing over the ulcer. I have done this consistently, as most surgeons do, to prevent a possible perforation later, and also to close the pylorus temporarily and thereby give rest to the ulcer area; and I think I may say that I have carried out this little manœuvre with as much precision as anyone who does not actually pass a ligature round the gut. Yet, since omitting the duodenal clamp and exploring the interior of the duodenum after applying these sutures I have, not infrequently, been able to pass my forefinger into the stomach easily, and at other times have come up against a diaphragm which would allow a large lead pencil to pass; and this diaphragm has sometimes been due to the pathological stenosis and not to the sutures. I have never found a complete block established by the stitches.

After-treatment.

There is one important point in after-treatment. It is generally thought that vomiting is more pronounced immediately after gastro-duodenostomy than after gastro-enterostomy, and in my experience this is true. I was much puzzled to account for this, and was inclined to think at first that it was due to

the anastomosis becoming involved in adhesions; I felt so sure of this that in one of my earlier cases, where vomiting was very persistent, I reopened the abdomen about the fourth day after the first operation, only to find the anastomosis quite patent and entirely unincumbered by adhesions. I found the explanation, or what I believe to be the explanation, quite by accident when operating on a dog. In this animal merely touching the duodenum and the pyloric part of the stomach is sufficient to throw them into the most violent spasm; indeed, they become as hard and firm as a piece of solid rubber, and remain in this condition so long as they are being handled. The intestine beyond the duodenum does nothing comparable to this. Though we do not see anything in man in anything like this degree, we do see minor states of spasm, and I have no doubt the handling of the duodenum, especially whilst mobilising it, throws it into an irritable state, from which it takes some time to recover. Now I put all my cases on to continuous rectal glucose immediately after operation, and do not allow them anything by mouth for 24 to 48 hours, and since doing so I have had no more trouble from vomiting than after gastro-enterostomy.

Results.

There have been two deaths; both patients were very emaciated before operation, and I think might have been saved if I had kept them longer on rectal glucose, and added intravenous glucose and hypertonic chloride to the pre-operative treatment. Three cases returned with some abdominal discomfort, flatulence and marked constipation, and were, apparently, cured by medical attention to the bowels. All the other cases, so far as I have been able to trace them, have had no trouble at all; they eat anything and abuse their stomachs with as much freedom from discomfort as the average normal person.

There have been no instances of attacks of discomfort, flatulence, and diarrhœa following indiscretions in diet and so on, such as are seen after gastro-enterostomy in a certain number of cases—probably from 10 to 15 per cent. This sequel seems to be due to the stomach emptying rapidly into the jejunum, a part which is not intended to receive the stomach contents direct, and without a sufficient mixing of the contents with the important secretions poured into the duodenum. This is what the American literature speaks of as the "dumping stomach." In this connexion the recent paper by Mellanby (THE LANCET, July 31st, 1926) showing the close relationship between acidulated food in the duodenum and the effective secretory activity of the liver and pancreas, is interesting.

I have had no anastomotic ulcers when doing gastro-duodenostomy for chronic duodenal ulcer. There has, however, been one certain, and another doubtful, case after doing the operation for a gastro-jejunal ulcer following a previous gastro-enterostomy. This is rather a different thing from an anastomotic ulcer after a primary gastro-duodenostomy, nevertheless, it makes one hesitate in asserting that a new ulcer is never to be expected after this operation. If such an event should arise, however, one would still be able to do a posterior gastro-enterostomy, instead of the more serious and usual operation of partial gastrectomy.

The more physiological disposition of the parts after gastro-duodenostomy, as compared with gastro-enterostomy, probably accounts for the complete freedom from trouble after operation, and this, in my opinion, makes the former operation one to be preferred to the latter, especially as there is no greater risk to the patient's life, and probably a smaller risk of an ulcer at the anastomosis. There is a small percentage in which the operation is impossible or inadvisable, but no greater than the percentage of cases in which posterior gastro-enterostomy is impossible owing to obliteration of the lesser sac, or not advisable due to the difficulty of getting at the posterior surface, where there is a small stomach in a very fat patient.

THE IMPORTANCE OF MOTILITY OF BACTERIA

IN CLASSIFICATION AND DIAGNOSIS, WITH SPECIAL REFERENCE TO *B. pseudotuberculosis rodentium*.

BY J. A. ARKWRIGHT, M.D. CAMB., F.R.C.P. LOND., F.R.S.

(*From the Bacteriological Department, Lister Institute.*)

THE character of motility was formerly highly rated as a ready and reliable guide in classification and diagnosis of bacterial cultures, and no doubt the ability of a species or group of bacteria to form flagella must be recognised as very important from the point of view of evolution and classification.

As the result of laboratory experience in connexion with infective intestinal diseases, the use of motility as a diagnostic character has been largely abandoned in practice or given a less important position, since the motility even of normally highly motile organisms such as *B. typhosus* may be difficult to demonstrate, except in cultures kept under special conditions or of a certain age, and recently isolated strains sometimes are non-motile, or very slightly motile, when first examined. Of recent years it has been recognised that completely non-motile varieties of certain species, usually motile, such as *B. typhosus* or *paratyphosus*, may be met with. In 1903 Smith and Reagh described motile and non-motile forms of the hog-cholera bacillus and their distinctive agglutination peculiarities. Weil and Felix (1917) have emphasised the same features in the *proteus* group in dealing with their *B. proteus X*19 and its *H* amd *O* forms. The same authors and their colleagues have extended these observations to the similar variants in the typhoid-paratyphoid group, and Balteanu (1926) has recently shown that *V. choleræ* can also be obtained in an *O* or non-motile form, which has characters analogous to those found in *B. proteus*, &c.

The absence of motility is often a temporary feature of a culture, and may be only the fugitive result of growth on special conditions—e.g., on carbolic agar (0·1 per cent.) or in media of low nutritive value. A non-motile variant may, on the other hand, be apparently permanent and irreversible. The presence or absence of motility under these different circumstances has been consistently correlated with definite changes in the agglutination phenomena.

Motile bacilli of the intestinal group agglutinate in loose, flocculent, cumulus-like clumps, whilst non-motile forms agglutinate more slowly, often to a much lower titre, and in small clumps which are deposited in larger or smaller coherent granules. It has been shown, moreover, that after heating an emulsion of the motile form to 100° C. for one or two hours or even for a shorter period, agglutination only occurs in granules, and the heated emulsion may be quite unable to excite in rabbits the production of agglutinins for the flocculus-forming or heat-labile antigen.

Dysentery bacilli, being non-motile, do not agglutinate in loose floccules, but mainly in coarse granules.

B. pseudotuberculosis rodentium has in the past generally been considered a non-motile organism, and it is safe to say that the great majority of bacteriologists of the present day so regard it. A. Pfeiffer (1889), who originally described this bacillus, Zlatogoroff (1904), MacConkey (1908), Petrie and Macalister (1911), and Kakehi (1916), all categorically stated that it was non-motile. There have, however, been some dissentient voices. Galli-Valerio (1902), who pointed out that this bacillus was with difficulty to be distinguished from *B. pestis*, affirmed that the latter was non-motile in spite of the contrary opinion of Kitisato; he does not, however, actually mention this characteristic in speaking of *B. pseudotuberculosis*. The only writers who claim to have observed motility are Kossel and Overbeck (1901) and Byloff (1906). The former, after describing their failure to demon-

strate motility of *B. pestis* grown at various temperatures, state that all of three strains of *B. pseudotuberculosis rodentium* which they examined were motile when grown at room temperature, but not at 37° C. They made these observations at low temperatures because Mironesco (1899) had reported on the motility at similar temperatures of a bacillus somewhat resembling *B. typhosus* which was non-motile at 37° C. Byloff said that motility was only slight and not readily observed. Both Klein (1899) and Byloff (1906) succeeded in staining flagella, and stated that they were terminal, short, and single. Plasaj (1921), while admitting that he did not observe motility, stated that a single flagellum could be stained, but could only be demonstrated clearly in few individual bacilli. He describes its position as not terminal but "extrapolar," and doubts whether bacilli with terminal flagella could belong to the same species.

Resemblances between B. pseudotuberculosis rodentium and B. pestis.

The characters of *B. pseudotuberculosis rodentium* have been very thoroughly examined on account of its close resemblance to the plague bacillus. MacConkey (1908) and Petrie and Macalister (1911) showed that the fermentation reactions of the two were almost identical.

It was pointed out by Zlatogoroff (1904) that cross-agglutination could be obtained between the two species. This was confirmed by subsequent observers, and MacConkey (1908) and Rowland (1912) confirmed the existence of cross-immunity reactions, and showed that guinea-pigs could be protected against *B. pestis* by a vaccine made with the *B. pseudotuberculosis*.

The resemblance between the two organisms was so close that Petrie and Macalister (1911) found great difficulty in deciding to which species certain strains isolated from rats belonged. Almost the only reliable distinguishing character appeared to be the ability of *B. pestis* to produce acute septicæmia and death in rats.

The present writer recently had occasion to examine broth cultures of *B. pseudotuberculosis rodentium* microscopically for the presence of clumps. The cultures grown at 37° C. were usually quite non-motile, but in the case of one strain a very few motile bacilli were seen. He was at that time unaware of Kossel and Overbeck's observations. It was at first supposed that these were contaminants. The strains were plated on agar, and appeared to be pure with characteristic colonies. Single colonies were picked off and grown in broth at 37° C. and at room temperature (18°–22° C.), since it had been noticed that agar cultures at room temperature gave a more copious growth, which formed a more uniform and stable emulsion than those grown at 37° C. It was now found that broth cultures at 20° C. were motile. Eight strains of *B. pseudotuberculosis rodentium* were examined, of which two had recently been isolated from guinea-pigs by Mrs. Barratt, and six were obtained from the National Collection of Type Cultures. Of these, only one was slightly motile at 37° C., but all were motile when grown at 20° C. Some were very highly motile, others much less so. The difference in degree of motility consisted in the number of obviously motile organisms which swam across the field of the microscope. One strain which was at first only very slightly motile, after a few subcultures, was observed to be very much more motile. These cultures, after having been at room temperature for two days, were placed in the cold room, and were still motile after a month at −5° to +5° C. The identity of these strains with the classical *B. pseudotuberculosis rodentium* was shown: (1) by obtaining the characteristic reactions in carbohydrates, &c.; (2) by inoculating guinea-pigs, some intraperitoneally and others intracutaneously—typical lesions resulted in the glands and organs, and from these animals the same organism was again isolated from the blood and organs in pure or nearly pure culture; (3) by cross-agglutination with *B. pestis*. Agglutinating sera were prepared from two of the strains, which both agglutinated all the eight strains of *B. pseudotuberculosis* and also 10 strains of *B. pestis*. The titre of the sera was 1 in 1280–2560 for the homologous species and 1 in 160–640 for the strains of *B. pestis*. All the emulsions for these tests were grown at 20°–26° C.

The agglutination reactions showed that *B. pseudotuberculosis rodentium* conformed to the rule for motile bacteria, in that emulsions heated at 56° C. for 30 minutes agglutinated in loose flocculi to the limit of the titre, but after being heated at 100° C. for one hour, they did not clump in this manner. Emulsions heated at 100° C. in the case of two strains were agglutinated in granular form at a lower titre, 1/160 to 1/1280 respectively. The agglutination of *B. pestis* was not flocculent, but occurred chiefly in very small clumps, many of which were only visible under the microscope, but formed a very definite agglutination deposit with complete clearing of the supernatant. The emulsions of *B. pestis* were no longer agglutinable after being heated at 100° C.

The motility of *B. pestis* has been almost universally denied, but Kitisato stated in his original description that it was slightly motile, and Gordon (1897) claimed success in staining flagella and described the appearance of an occasional motile bacillus from agar cultures. It is, therefore, interesting to find that the agglutination of *B. pestis* by the serum made with *B. pseudotuberculosis* is due to heat-labile substance such as is usually associated with flagella. Cultures grown at different temperatures of all the strains of *B. pestis* used in the present investigation have been examined very carefully on several occasions, but no suggestion of motility was ever detected.

Motility in Relation to Parasitism.

It is also of interest to note that the non-motile form of *B. pseudotuberculosis rodentium* appears to be that which is adapted to parasitism, since the temperature at which alone motility can be observed —viz., 18°–26° C.—is not one which the bacillus would experience in the mammalian animal body. This adaptation of the non-motile form to parasitism is perhaps analogous to the occasional isolation of non-motile *B. typhosus* from carriers and cases of typhoid fever, and the high virulence of a non-motile form of *B. paratyphosus* A isolated by the present writer. A somewhat parallel case to the cross-agglutination of *B. pestis* and *B. pseudotuberculosis* exists in the relationship between *B. whitmori* and *B. mallei* (Stanton and Fletcher, 1925). These two bacilli produce very similar diseases, melioidosis and glanders, but may have different appearances in culture, and while the former is motile, the latter is non-motile.

Summary.

(1) *B. pseudotuberculosis rodentium* is motile when cultivated at 18°–26° C., but not as a rule when grown at 37° C. This is in accordance with the statement of Kossel and Overbeck, made in 1901.

(2) This observation is also in harmony with the statements of Klein (1899), Byloff (1906), and Plasaj (1921) that they had demonstrated flagella in stained films of this bacillus.

(3) This organism also shows evidence of possessing heat-labile and heat-stable antigens like the bacteria of the typhoid-coli group.

(4) It would appear that the motility of *B. pseudotuberculosis* when grown at 20° C. is sufficient to distinguish it from *B. pestis*.

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(*Continued at foot of next page.*)

CONCENTRATED CARBON-ARC LIGHT.

A SIMPLE METHOD TO IMPROVE THE EFFICIENCY OF THE FINSEN TREATMENT.

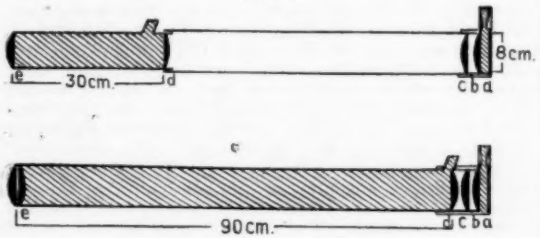
BY SVEND LOMHOLT, M.D., O.B.E.

(From the Finsen Institute, Copenhagen. Director: A. Reyn.)

Finsen's treatment of lupus vulgaris with concentrated rays of a carbon arc remains the unrivalled *traitement de choix* of this troublesome disorder, though it is rather expensive. The strong heat, resulting from the powerful heat rays of the carbon arc, prevents the raising of the intensity of the short wave irradiation above the amount produced by a carbon arc of 50 amps., 55 volts and filtered through 31 cm. of water. The construction of this is shown in the drawing (Fig. 1).

Finsen made many attempts to improve this construction, and especially to reduce the heat, but without any perfect success. At last he restricted himself to a water filter of about 30 cm. length (Fig. 1) which he thought would remove all the

FIG. 1.



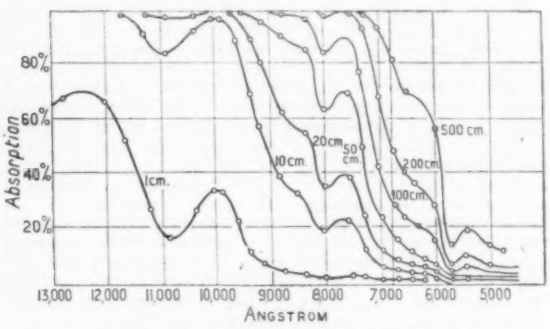
Finsen's original model: author's modification. a, b, c, d, e, Quartz lenses. The hatched area indicates distilled water.

infra-red radiation of the light. Yet it is clearly seen from the Aschkinass classical investigations on the absorption of water [1] (Fig 2), to which my attention was first drawn by Dr. W. Kuhn and Dr. D. Dennison, that a fairly large proportion of the innermost infra-red rays pass through a water filter of 31 cm., as used in the original Finsen lamp and still more through the 16 cm. of the Finsen-Reyn lamp, the two constructions most commonly used at present for local carbon-arc light therapy. For the therapeutical use of the carbon-arc light this fact is most important.

In the first place the maximum of energy of the arc light lies at about this place in the spectrum (see the diagram (Fig. 3) made by Prof. E. S. Johansen showing the distribution of energy of the carbon-arc light). In the second place the infra-red rays are especially inconvenient in the Finsen treatment, as compared with the luminous rays. Sonne [2] showed that the skin of a man's forearm will usually stand an average irradiation of 3·11 g. calories per square cm. per minute of luminous rays without any unbearable pain, but only 1·77 g. calories of the inner infra-red rays, because the luminous rays penetrate much deeper into the skin (several centimetres) than the invisible. Thereby their energy is distributed throughout a much thicker layer of the tissue.

From the curves of Aschkinass and Johansen it seemed evident that an increase of the water filter up to 100 cm. of length must be very favourable to

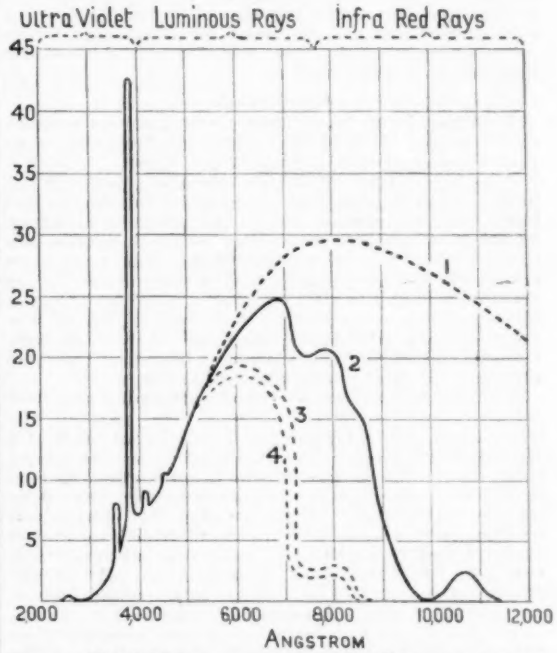
FIG. 2.



Absorption of light in water (after Aschkinass).

make the light column less hot and less injurious to the skin. This increase will not affect the efficient "chemical" part of the spectrum. The thermal energy of a light column (from the arc lamp described above), which had passed through the original

FIG. 3.



Energy of the light from a carbon arc (after Johansen). 1. Total energy. 2, 3, 4, Energy passing a water layer of 16 cm. (Johansen), of 100 cm. (calculated after Aschkinass), and of 120 cm. respectively.

apparatus of concentration, was now accurately measured and compared with the energy of the same column after it had passed an apparatus with a filter of 90 cm. water. For these measurements a special instrument was constructed by Mr. J. C. Jacobsen; a Dewar's vessel was blackened inside and filled with

[1] Annal der Physik und Chemie, 1895, Bd. lv., p. 420.
[2] Acta medica Scandinavica, 1921, p. 374 ff.

Motility of Bacteria: References (continued).

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water. The opening was closed with a plate of quartz except for a small slide in the upper side to permit the introduction of a thermometer. We found this instrument ideal for the purpose. The measurements gave the following figures:

	(1)	(2)	(3)	
Original construction ..	125 ..	124 ..	114	gr. calories per min.
New "	70 ..	76 ..	70	" " " "

Thus, the increase of the water-layer from 31 to 91 cm. diminishes the heat of the light column by more than 33 per cent, corresponding well to the figures given by Aschkinass and Johansen (Figs. 2 and 3).

The therapeutic experiments gave a result which was in perfect accordance with this. The treatment with the new apparatus proved to be almost painless, even to very sensitive patients. Fortunately, the therapeutic effect—i.e., the reactions on the skin (redness, infiltration, and bulla formation)—remained completely unaffected. To make certain of an unreduced therapeutical effect, a series of six double biopsies were made on six patients, who received each one spot treated with the original and one spot with the new construction. Three of the patients were treated on lupus plaques, three on sound skin. The examination showed that the histological changes were perfectly equal as far as each of the six different pairs were concerned. The most important result of the described reduction of the heat rays is that it permits of a corresponding increase of the irradiation, and even somewhat stronger, up to about 50–60 per cent., without being painful to the patients. The reaction of the skin after one hour of this radiation seemed to be not much inferior to that of two hours of the original construction. These facts were also confirmed by histological examinations. The perfect tolerance of the patients under this very strong treatment is probably due to the fact that the part of the light which is removed by the thick water column contains just the infra-red irradiation which is especially painful to the skin because of its superficial effect and absorption.

Conclusions.

1. Water is an ideal filter to be used in carbon-arc therapy. It lets the efficient ultra-violet rays pass untouched even through thick layers.

2. A water layer of 91 cm. absorbs almost all the infra-red and a good deal of the outer red rays in the light—i.e., of rays of 7300 Angstrom still about 50 per cent. are absorbed. Calometric measurements showed that a light column, which has passed an apparatus of concentration with a water filter of this thickness, contains 30–45 per cent. less heat than a corresponding column that has passed one of the original apparatus with filters of 31 and 16 cm. (Finsen and Finsen-Reyn lamps). The filter does not diminish the therapeutic effect of the light.

3. According to Sonne's investigations the absorbed infra-red and red rays represent the part of the irradiation of the carbon arc most inconvenient for light therapy since they are absorbed in the uppermost layer of the skin in which very sensitive part of the body they produce a strong heating that gives rise to *severe* pain. Consequently, the elimination of them will permit an increase of the intensity of the irradiation which is considerably stronger than the said 30–45 per cent. that is their part of the thermical energy of a carbon-arc light column, which remains after it has passed a water layer of 16–31 cm.

4. Clinical and histological observation showed that it is possible to increase the biological effect of the concentrated carbon-arc light by using water filters thicker than the ordinary ones and this considerably more than indicated by the 30–45 per cent. mentioned.

COST OF IRISH MENTAL PATIENTS.—The Department of Local Government of the Irish Free State has issued a comparative statement showing the annual cost of maintaining mental patients in the State institutions. The figures range between £55 16*s.* 11*d.* at Kilkenny and £40 12*s.* 8*d.* at Castlebar; the average is £49 1*s.* 4*d.* In most cases there has been a reduction as compared with 1925.

THE TREATMENT OF TUBERCULOSIS BY MR. SPAHLINGER'S METHODS.

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FROM time to time certain persons in this and other countries, but particularly in this country, strongly advocate the expenditure of large sums of public or private money to assist Mr. Henri Spahlinger, of Geneva, to apply his secret remedy for tuberculosis to "sufferers" in general. Hitherto there have been published for the medical profession and others interested in this matter few, if any, accurate records of cases treated by this method. The only data on which to form an opinion so far available have been of the nature of eulogies of this remedy, citing remarkable cases of "cure." And these are to be found mostly in the non-medical press.

Selected Cases Treated in 1913–14.

Yet we have in this country a most careful and full record of ten cases treated under the immediate supervision of Mr. Spahlinger himself between November, 1913, and August, 1914. This work took place in a London teaching hospital under conditions deal for research. It was under the supervision and with the coöperation of a very learned and wise physician whose opinion on such a matter would carry almost universal conviction. During this period the late Dr. Arthur Latham gave these selected cases as a test for Mr. Spahlinger. The treatment was carried out personally by Dr. J. W. Linnell, with Mr. Spahlinger actually at his elbow. Dr. Linnell was at that time working with Dr. Latham as Gibbons Research Student. The usual precautions were taken to explain the experimental nature of the treatment to the patients concerned (and to the parents of the younger ones). The choice of having the treatment or not was left to the patient's own inclination.

The records of these cases are here set forth as obtained from the medical notes of St. George's Hospital. There were about an equal number of cases treated at the same time, under similar conditions, in nursing homes. Owing to the untimely and deeply regretted death of Dr. Latham all records of these have been lost in the destruction of his private notes. Of these ten, I have succeeded in tracing the after-history of eight. Of the two untraced, I have hardly sufficient information to identify them with certainty, even supposing I could find their names in the Registrar-General's records at Somerset House.

These cases were selected by Dr. Latham with the utmost care and skill. They were all (with one possible exception) of rather advanced chronic type, not immediately and absolutely hopeless. So that although few in number, they are the sort of cases in which an arrest of the disease with a return to reasonable health and life on the part of several of them would have indicated the presence of a curative agent in Mr. Spahlinger's preparation of such a nature as we have at present no knowledge.

Many of them had had previous courses of "aurocyanide," with negative results. Dr. Latham was testing this forerunner of sanocrysin at that time. Two of the cases were especially chosen to test the effect on lupus and spinal caries.

The Ten Cases Related.

In tracing the after-histories, I am deeply indebted to Miss Hamilton, lady almoner of St. George's Hospital, for her diligent search. The extent of infiltration in the lungs was judged in all cases both by physical and radiographic methods. Here are the cases in detail:—

CASE 1.—I. H., female, aged 37, admitted Nov. 11th, 1913. Cough for many years. A recent hæmoptysis of

2 pints. No family history of phthisis. An old arthritis of left ankle and knee (? due to the intracellular diplococcus). An infiltration of all left lung and right apex. T.B. ++ in sputum. Only slightly febrile. From November to January a course of aurocyanide injections without much improvement, but some gain in weight. February to May, 26 injections of Mr. Spahlinger's preparation, each giving brisk febrile reactions. Signs in lungs drier. T.B. in sputum, three found by antiformin method. Weight maintained. Discharged June 9th, 1914.

Untraced. Not known at any original addresses, or address of brother. The M.O.H.'s of Wandsworth and Westminster, in which districts she is known to have lived, have no trace except her original notification.

CASE 2.—A. H., female, aged 29, admitted Nov. 20th, 1913. Tuberculous hip-disease as a child, now healed. Always had a cough. Lupus on face for years. Had been treated for some time with tuberculin injections and Finsen light. Both father and mother died of tuberculosis. Two brothers and one sister died of chest trouble. Hip appears healed. Moderate patch of lupus on face. An occasional asthmatic attack in hospital—slight. Signs in lungs indefinite; contracted and rather opaque apices. Sputum examined 14 times. T.B. + once, and two bacilli found on one other occasion. Afebrile. November to December, 1913, had 18 injections of aurocyanide. Lost 5 lb. in weight. February to August, 1914, had 29 injections of Mr. Spahlinger's remedy. Brisk short reactions. Regained 5 lb. of weight. Discharged August 18th, 1914.

The lady almoner of Guy's Hospital reports she saw this lady alive in May, 1926. She had married seven years previously, and was seeking advice for a suspected pregnancy. Her face was very much disfigured with lupus, for which she had had no treatment for years.

CASE 3.—M. H., female, aged 37, nurse, admitted Dec. 18th, 1913. A cough for four years. Tuberculosis diagnosed 18 months ago. Has had courses of tuberculin and sanatorium treatment. Has lost 2½ st. in all. Voice rather husky. A general infiltration of both lungs with one fair-sized and several small cavities at the left apex. Early tuberculosis of the larynx. Sputum T.B. ++ Moderately febrile. From January to March, 12 injections of aurocyanide. Lost 4 lb. Physical signs stationary. April to July, 17 injections of Mr. Spahlinger's preparation. Physical signs unaltered. Sputum less in amount, and T.B. +, rather fewer. Lost five more pounds in weight. Discharged July 23rd, 1914.

The tuberculosis officer of Berkshire reports that she died in 1915.

CASE 4.—M. C., male, aged 27, traveller, admitted Nov. 15th, 1912. Cough for one year, wasting, &c. Two maternal uncles died of phthisis. Signs of infiltration in right lower lobe. T.B. + in sputum. Was discharged to sanatorium after one month in hospital. No record of time in sanatorium. But cough and pain in chest returned shortly after as bad as ever, and was readmitted to St. George's on Jan. 26th, 1914.

Well nourished. T.B. ++ in sputum. Consolidation and cavitation in upper two-thirds of right lung. Some slight general infiltration of all left lung. A low intermittent pyrexia lasting a few days at a time. Often goes a week at a time with normal temperature. February to May, 24 injections of Mr. Spahlinger's preparation. Very marked reactions with rigors and vomiting. Lungs drier. T.B. ++ in sputum. Amount of sputum diminished. Discharged June 4th, 1914.

On June 30th, 1914, was readmitted for a second course, having had two injections as an out-patient. Three further injections given as in-patient. Weight stationary, sputum scanty, but T.B. still ++. Discharged July 20th, 1914.

A letter from the patient's mother dated June 5th, 1926, says: "... after leaving St. George's (he) spent the winter at Brompton Hospital, and from there went on to Frimley, where he gained much benefit so that in the autumn of 1915 he entered into business.... He got on very well.... He got married in March, 1917. (And later on that year)... he quite broke down and went to Margate for a change. He passed away in September, 1917."

His death is confirmed by the M.O.H. for the Borough of Stoke Newington.

CASE 5.—T. T., male, aged 50, clerk, admitted March 7th, 1914. He had been treated for three months outside hospital immediately before admission by Mr. Spahlinger. Cough and "asthma" for five years. Lost a good deal of weight in the last two years. Voice hoarse for seven weeks. One brother died of phthisis. Considerable infiltration of both lungs. T.B. + in sputum. Wassermann negative. Sputum 2 oz. per day. Very marked tuberculosis of the larynx. Temperature irregular but never above 99° F. Was discharged March 16th, 1914, for further treatment by Mr. Spahlinger outside the hospital.

The M.O.H. for the Borough of Lewisham reports that he died in a nursing home in London in 1914.

(*Note.*—This case was one of the private ones who came into hospital by chance. He had at least 24 injections of Mr. Spahlinger's preparation, and probably a good many more.)

CASE 6.—B. M., female, aged 22, typist, admitted March 12th, 1914. She was an in-patient of the hospital in November, 1913, for 11 weeks. Signs then showed general consolidation of the right lung with cavitation at apex, and infiltration of the upper half of the left lobe. T.B. + in sputum. During this admission she had 11 injections of aurocyanide with no improvement and slow loss of weight.

On admission this time had lost another ¾ lb. since discharge. Her temperature was fairly level. Pulse 88–100. Signs as before. March to May, 17 injections of Mr. Spahlinger's preparations. Some brisk reactions to intravenous injections. Amount of sputum less at first, later increased. Physical signs remained the same and T.B. + in sputum, as before. Lost 2 lb. in weight. Temperature at end of course tending to be more constantly febrile. Discharged May 3rd, 1914.

On June 5th, 1914, was readmitted. Lost 1 lb. since discharge. No appreciable change in lungs. Sputum less in amount, but T.B. now ++. Had six further injections, with reactions as before. Had lost a further 3½ lb. on discharge. Otherwise the same. Discharged July 2nd, 1914.

She lived at home for some months. From March, 1915, onwards she attended the tuberculosis department at St. George's at intervals. She was admitted to the Brompton Hospital in May, 1915. Thence she was sent to the Royal National Hospital, Ventnor. A progress report on discharge from this institution on Nov. 9th, 1915, shows her condition to have altered little. T.B. still + in sputum and fairly afebrile. Through 1916 she appears to have lived at home, doing little and changing little. A report in January, 1917, says she was "working" with a temperature of 99° F. at 2 P.M. and pulse of 102. In April the same year a further report says extensive disease both lungs, febrile, œdema of legs, and hæmoptyses. She died April 10th, 1917.

CASE 7.—J. A., male, aged 22, admitted April 7th, 1914. Had just returned from Malaya, having noticed lassitude, loss of weight, cough and sputum for six months. Pale and thin. Infiltration upper two-thirds of both lungs, with small cavities at both apices. The infiltration is scattered and not very heavy. T.B. + in sputum. Temperature mildly febrile, only occasionally up to 100° at night. April to July, 17 injections of Mr. Spahlinger's preparations. Smart reactions, especially with "serum." Sputum decreased, though T.B. still +. Weight as before. Signs the same. Discharged July 27th, 1914.

A report from the M.O.H. of the counties of Moray and Nairn, dated June 17th, 1926, says: "... about the outbreak of war in 1914 he was exempted from service, and was engaged for a considerable period as salesman ... in Elgin. I saw him frequently, when the disease seemed to be fairly quiescent.... He left this district for the South.... I lost sight of him till 1921, when he returned home to his parents ... about ... October in that year and died about a fortnight later on Oct. 16th, 1921."

CASE 8.—G. E., female, aged 31, admitted April 11th, 1914. Four years ago first had pain in her back, which shot down right thigh. Eighteen months after that spinal deformity was first noticed, but patient continued to work for six months after that. Was then under medical care on back for ten months. Then up and about for six months. From then onwards—i.e., last six months—has been on back under further treatment in a sanatorium. Had a course of Mr. Spahlinger's preparations outside the hospital in January. No cough or sputum or other lung symptoms. Angular deformity of several vertebræ in the lower dorsal spine. Much rigidity of back, and pain on jarring. Lungs have a poor note at left base, otherwise not abnormal. Slight fever at times. April to July: Treated with 21 injections of Mr. Spahlinger's "serum." Very marked reactions. Temperature steady between reactions. Was walking on discharge with a poroplastic jacket. Discharged July 31st, 1914.

This patient has not been traced. Visits to the home of the parents and relations in West Sussex have revealed no trace of the family, nor any neighbour who knows anything about them.

CASE 9.—F. B., male, aged 18, admitted May 4th, 1914. Fourteen months ago developed pleurisy at the left base. Cough, night sweats, &c., since. Pulmonary tuberculosis diagnosed six months ago, has improved since. Well nourished. T.B. + in sputum. Infiltration of all right lung and left lower lobe. Temperature up and irregular. Only three injections of Mr. Spahlinger's cure given. Some reactions. Patient was removed from hospital by his

parents before course completed. No alteration of physical signs on discharge. Discharged June 13th, 1914.

The tuberculosis officer of Kent reports that he died on March 1st, 1916.

CASE 10.—M. O., female, aged 22, admitted May 11th, 1914. Onset of disease 18 months ago with cough, sputum, night sweats, wasting, &c. One year ago was sent to sanatorium for a period of six months. Signs of infiltration in the right lung and left upper lobe. T.B. ++ in sputum. Irregular swinging temperature, average 101·5° F. at night. May to June, six injections of Spahlinger's preparations. Lost weight all the time. Signs spread to rest of left lung. T.B. ++ in sputum. Discharged July 8th, 1914.

The tuberculosis officer for the Borough of Fulham reports that she died in Fulham Infirmary in the same year—1914.

Summary of Results.

The following table summarises these results briefly :—

Case.	Sex.	Age.	Site of disease.	No. of inject.	Immediate result.	Further treatment.	Final result.
1	♀	37	Lungs.	26	Sl. imp.	N. tr.	N. tr.
2	♀	29	Lupus.	29	No change.	? Finsen light; none for yrs.	Alive; married 1926.
3	♀	37	Lungs.	17	Sl. worse.	No record.	Died 1915.
4	♂	27	,,	29	Very sl. better.	Brompton Frimley.	,, 1917.
5	♂	50	,,	24*	No change.	—	,, 1914.
6	♀	22	,,	23	Sl. worse.	Brompton Ventnor.	,, 1917.
7	♂	22	,,	17	? Sl. imp.	None.	Worked; died 1921.
8	♀	31	Spine.	21	Imp.	N. tr.	N. tr.
9	♂	18	Lungs.	3	No change.	No record.	Died 1916.
10	♀	22	,,	6	Rapidly worse.	Fulham Infirm.	,, 1914.

* Two courses (24 at least).
Sl. imp. = Slightly improved. N. tr. = Not traced.

Conclusion.

They may be shortly reviewed thus. The case of lupus is still alive. Lung lesions are notoriously benign, as a rule, in individuals with lupus. The spinal case is untraced, but may possibly be alive—such cases do live for years. One of the lung cases is untraced. Of the remaining seven all are dead. It is difficult to say that any of them showed any improvement after their treatment; certainly none showed marked improvement. Such slight indications as there are of improvement are not more than one would expect from tuberculous patients after they had been in bed for periods of time such as these were. The two who lived to 1917 both had much further orthodox treatment at the Brompton Hospital, Frimley, and Ventnor. The one who died in 1921 is one of those cases to be found in any tuberculous series who lives longer than one would expect. Also he was the patient in this series with the least disease and the shortest history.

SWINDON HOSPITAL SERVICE.—For a long time past there have been serious difficulties connected with hospital accommodation at Swindon, and the town council recently sought a way out by proposing to purchase an expensive site for the creation of a municipal hospital. The Ministry of Health has, however, refused to sanction the purchase on the ground that the case for a municipal hospital has not been made out.

BIRMINGHAM HOSPITAL SATURDAY FUND.—This year's collections amounted to the record sum of £64,500, and after providing for the Fund's own convalescent homes and special expenditure, £26,000 is being distributed to hospitals and institutions. In addition £5250 has been spent on hospital tickets, £3500 has been given as a special grant to the guardians, and £5250 contributed to the Droitwich Hospital for the Treatment of Rheumatism.

Clinical and Laboratory Notes.

A CASE ILLUSTRATING THE EFFECTS OF PROLONGED APPLICATION OF COLD TO THE EYE.

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THE following case seems to be worthy of record :—

A myopic woman, aged 52, who was suffering from traumatic subconjunctival ecchymosis in the left eye, was advised by her doctor to keep an ice-bag constantly over her eye, in order that absorption of the blood might be hastened. Unfortunately she kept up the treatment for nearly a fortnight; the subconjunctival hæmorrhage mostly cleared up within the first few days, but after about a week the patient developed severe neuralgic pain on the left side, and, after a fortnight, acute congestive glaucoma in the left eye, with ptosis.

There was marked increase of intraocular tension, severe pain and tenderness, haziness of cornea (vision being reduced to nearly 3/60), and contracted fields of vision of the glaucomatose type. She also suffered from violent neuralgic pain in the left forehead and temple; the skin over the course of the left supraorbital nerve was very tender, and the patient retracted her head at once whenever the supraorbital region was touched. The ice-bag lying on her left forehead was responsible for this complaint also.

When I saw the patient in this condition eserine drops were at once instilled, and she was put on bromides, salicylate, hyoscyamus, and gelsemium mixture, with fomentations to the eye; the left temple was blistered. To relieve her supraorbital neuralgia, soothing applications were given, but as the glaucomatous pain in the eye persisted with high tension, I trephined her, with the result that she had immediate relief from pain and the haziness of the cornea cleared up, giving her a greatly improved vision. She recovered, but the ptosis persisted for nearly a week more.

The trauma which caused the ecchymosis cannot be regarded as responsible for the glaucoma, which developed a fortnight afterwards. The points of interest in the case are: (1) that acute congestive glaucoma occurred in an eye with as much as eight diopters of myopia, which is unusual; (2) that the attack of congestive glaucoma was brought on by the prolonged application of cold on the eye; and (3) that trephining for acute glaucoma showed itself just as satisfactory an operation as iridectomy.

It may be mentioned that subconjunctival ecchymosis coming on several days after an injury indicates fracture of the base (anterior fossa) of the skull. If, however, ecchymosis comes on immediately after the injury and is not associated with any other intraocular lesion, it is not in any way serious, and always takes its time to clear up. Prolonged application of ice on the eye is unnecessary and injurious.

BLACKWATER FEVER IN SCOTLAND.

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IN view of the rarity of blackwater fever in this country, the following case appears to be worthy of record.

The patient, D. M., aged 28, was a native of the Outer Hebrides and had previously enjoyed average good health. In 1916 he served in the army in Gallipoli and contracted malaria. No record could be obtained of the type of infection, but the disease does not appear to have been severe. After a brief sojourn in Scotland he obtained an appointment in Nigeria in 1918, his employment entailing much travelling about the country. He left Nigeria for this country on Nov. 4th, 1924, apparently in good health. From 1916 to 1924 he had kept a record of his malarial attacks, and he reckoned the number as 25, none being of special severity. He was certain that he had never shown any manifestations of blackwater fever during that period.

Having spent the winter months in Lewis, he started out on his return to the West Coast of Africa early in March

1925. Arriving in Aberdeen during a snowstorm, he lodged in a hotel where the present illness developed suddenly on March 12th. The onset was heralded by a rigor, followed by irregular fever with marked bilious symptoms. On the first day the patient took 15 gr. of quinine sulphate by mouth, but this does not appear to have been retained. On the following day he was alarmed to find that he was passing very dark urine. The symptoms becoming worse, he was admitted to hospital on March 14th.

Condition on admission.—Temperature 100° F., pulse-rate 88. There was some epigastric distress, and vomiting of a bilious type was severe and prompt after any attempt to swallow fluids. Splenomegaly was present, the organ being just palpable, while the liver appeared to be normal in size. The skin and sclerotics showed a marked saffron yellow tint. On the day of admission and on the following day he passed a few ounces of urine of a mahogany colour. He was constipated. All the symptoms increased in intensity until March 16th, after which they gradually subsided. The vomiting was particularly severe, necessitating the use of a small amount of opium. The only fluid tolerated for any time by mouth was iced champagne, so that frequent rectal and intravenous administration of normal saline was a necessity. No urine was voided after March 15th, and constipation defied all attempts to procure a movement of the bowel. A feeling of intense weakness developed, and as a result of the suppression of urine slight convulsions appeared on March 22nd, rapidly terminating in coma and death on the same day.

Blood films failed to reveal the presence of malarial parasites, and the red corpuscles showed no abnormality. The white cell count on the day after admission was as follows: polymorphonuclear cells 74 per cent., large mononuclear cells 13 per cent., small lymphocytes 11 per cent., eosinophil cells 1 per cent., and transitional cells 1 per cent. The fæces showed no pathological organisms and no unusual protozoa. The urine contained a large amount of albumin and a large deposit of brownish granular material. Blood corpuscles were entirely absent and spectroscopic examination gave the characteristic bands of oxyhæmoglobin.

A noteworthy point in connexion with this case is that the disease developed more than four months after the patient had left an area in which it was endemic.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTIONS OF ELECTRO-THERAPEUTICS AND SURGERY.

SURGICAL ASPECTS OF DIATHERMY.

A MEETING of these Sections was held on Dec. 17th, when there was a discussion on the surgical aspects of diathermy. Dr. G. BATTEN (Electro-Therapeutics) took the chair.

Dr. E. P. CUMBERBATCH opened the discussion, his main purpose being to deal with the technical aspects of surgical diathermy and the methods of performing the operation. The temperature of tissues, he said, could be raised by passing through them a current of considerable intensity. By making this current alternate with high frequency the undesirable stimulation of muscles and nerves and the production of electrolytic changes in the tissues were avoided, and by confining the current within a narrow path the tissues in that path were deprived of their vitality. Hence such a process was available for surgery.

Diathermic Coagulation.

To produce coagulation of abnormal tissue, said Dr. Cumberbatch, the current was increased sufficiently to cause a high temperature, an electrode of small area being placed on the tissue to be destroyed, and the circuit completed by a large area electrode placed on another part of the body. Eventually, under the influence of the gradually increasing current, the tissues began to boil, and later sparks passed from the edge of the disc, over the coagulated (now dried) tissue to the uncoagulated part beyond. The current should not be continued after the appearance of the sparks, as the coagulation would only very slowly proceed to a greater depth. The difficulty of application by means of the disc electrode was that the operator could not see the extent, in depth, of the tissue coagulation. Experiments carried out on excised tissue showed that the depth of the coagulation equalled the diameter of the disc. In living tissues the circulation removed some of the heat generated by the current and prevented the coagulation from spreading, but destruction took place beyond the limit of coagulation—a point to be remembered when important structures were in close proximity. The depth of the coagulation was much more under control when a single needle was used instead of a disc. Coagulation commenced at the needle point, then proceeded up the shaft to the surface, and the depth of coagulation was determined by the depth of insertion of the needle, and the coagulated mass took the form of a narrow cylinder. By putting the needle into a number of sites closely adjacent to each other destruction of a wider area could be brought about. With multiple needle electrodes there could not be the same certainty as to the depth of the destruction brought about.

Circumvallation and Operations with the Blade Electrode.

Circumvallation, continued Dr. Cumberbatch, was the operation by which a malignant growth was surrounded by a rampart of coagulated tissue. The single needle electrode was put obliquely into the healthy tissue adjoining the growth to a point below the growth, and the tissue was coagulated around it. By repeating this in adjacent parts in succession, the needle being each time directed to the same point below the growth, the coagulated rampart would be cone-shaped, and the growth would be imprisoned within it. Diathermy of the growth would not now be likely to cause metastasis. This method was being widely practised in America.

In the old method of using the blade electrode it was inserted into the healthy tissue around the growth and was moved forward slowly enough for coagulation to keep in advance of the cutting edge. The blade must cut only coagulated tissue, which was difficult to ensure, and if other tissue or unsealed vessels were cut bleeding occurred, with its disadvantages and risks. By the new method a strong current was produced before the blade was brought into contact with the tissue. Contact was then made and the blade drawn into and across the tissue with the same speed as the scalpel was used in a cutting operation. The tissue divided as the blade was drawn across it, and a white line of coagulation marked the track of the electrode. The facility of division of the depth of coagulation of the divided surfaces varied with the different diathermy machines; those giving a maximum current at a relatively high voltage were less suitable than others. With a low voltage tissue was divided easily, but the amount of coagulation was slight.

The best way to deal with accessible malignant tissue, said Dr. Cumberbatch, was to do a preliminary circumvallation and then remove the growth by the blade electrode. When there was widespread disease so that circumvallation could not be done, it was best to accomplish as much coagulation as possible by means of the disc electrode and allow the tissue so isolated to separate spontaneously. After diathermy healing was rapid, even if complete destruction had not been brought about, and any recurrence could be dealt with in a similar way.

Fulguration.

In the operation of fulguration, he continued, the tissues were destroyed by the heat derived from sparks. The surface might be carbonised by the sparks, but the destruction by this method was not very deep. It was suitable for destroying papillomata of skin and mucous membrane, and in America hæmorrhoids and enlarged tonsils were treated in this way. Whilst in New York he had seen Dr. W. Bierman operate for hæmorrhoids by this method.

He first injected a dilute solution of novocaine into the sphincter ani; the sphincter was then dilated, an earth connexion was made, and sparks from an Oudin resonator played on to the hæmorrhoids, which became thus reduced to dry masses. The only pain felt was that due to insertion of the syringe needle, and the patient could go on with his ordinary work in two or three days. For enlarged tonsils surface anæsthesia was produced and the sparks were applied by special directors to prevent other parts receiving them. This was done again at intervals of two or three weeks until complete removal had been effected.

Electro-Desiccation and Wyeth's Cutting Current.

By the method of electro-desiccation devised by W. L. Clark, of Philadelphia, said Dr. Cumberbatch, a current of low amperage was passed through the tissue by a needle electrode, thus dehydrating it. It could be accurately localised and was under the complete control of the operator. Even corneal ulcers and papillomata of the vocal cords could be treated by it; the cosmetic results were very good and the inflammatory reaction slight. The latest advance in the use of high-frequency currents in surgery had been made by a New York surgeon, G. A. Wyeth. He used the current for cutting and for coagulating the cut surfaces, the coagulation being limited to a depth of 0·1 mm. He employed a current with a sustained oscillation, the alternation being at the rate of about five million per second. Healing by first intention would take place after the tissue had been divided in the way described. Post-operative shock was said not to occur.

Discussion.

Mr. F. J. STEWARD said that his experience with diathermy was confined to new growths on the surface of the body or in the mouth or pharynx. Its superiority over the cutting operation was evident if certain conditions of technique and choice of cases were satisfied. The final results from the two methods were identical. Diathermy was almost a bloodless operation and its use was quicker and more precise. The hæmorrhage and post-operative shock after the use of the knife frequently paved the way for sepsis, with, perhaps, secondary hæmorrhage or pneumonia. After diathermy recovery was rapid and complications were uncommon; there was also a remarkable freedom from pain after the operation. This freedom from pain was an inducement to choose the method in carrying out palliative treatment in cases too advanced to give hope of cure. To ensure destruction of the growth together with a considerable amount of surrounding tissue the growth must be thoroughly exposed to vision; this exposure could generally be ensured by retractors, gags, and sutures, though sometimes a preliminary operation might be needed. He had not chosen diathermy when the growth involved bone, for when the sequestrum had separated after diathermy recurrence was usual in the bed which had been occupied by the sequestrum.

Mr. GWYNNE WILLIAMS said that he agreed almost completely with what Mr. Steward had said. He spoke on the use of the method for carcinoma of the tongue and floor of the mouth, for which he had not used the knife for six years. He limited the method to cases which he considered operable. His difficulty had been to keep the diathermy knife going at the correct pace and to keep the current reasonably constant. Sometimes the lingual artery had to be tied and it was always the safer plan to tie as reactionary hæmorrhage was then much less likely. It was just as important for the mouth to be kept clean for diathermy as for an operation with the knife. He agreed that the scar left after diathermy was much softer than that which followed use of the knife. The likelihood of recurrence was the same. For operations on the tongue his practice was to remove the glands in the neck very freely at a separate operation.

Mr. DOUGLAS HARMER said that surgical diathermy was first done in England at St. Bartholomew's Hospital in 1910 by Prof. Nagelschmidt, who was introduced by the late Dr. Lewis Jones. It was for removal of a large pedunculated malignant growth of the nasopharynx. The result was good and there was no bleeding. Sixteen years experience with this method had convinced Mr. Harmer that it was better than simple excision with the knife. Indeed, he thought malignant ulcers should not be removed by cutting when diathermy was available. Only two of his cases had succumbed from bleeding. When bone was involved it should be freely destroyed; bone involvement was no contra-indication to the treatment. In many instances radium and X rays were needed either before or after diathermy. Probably by using diathermy in preference to simple excision for malignant ulcers in the upper air passages the number of cures obtained had been at least doubled.

Mr. H. H. RAYNER gave an account of his experiences with diathermy in cancer of the skin and of the breast. Not only was the method preferable to use of the knife, but, he thought, the risk of local recurrence was less. In advanced epithelioma of the skin diathermy gave better results than the knife; the surgery was minimal and the ultimate condition more satisfactory. Very advanced cancer of the breast could also be treated by diathermy with considerable benefit.

Dr. THOMAS MARLIN spoke of the path pursued by the diathermy current and described the results of his experiments on egg, turnip, and beef.

Mr. GORDON TAYLOR said that as a result of his experience with over a hundred cases of operable carcinoma of the mouth treated by diathermy—of which 84 were carcinoma of the tongue—he was convinced that the results in carcinoma of the tongue treated by diathermy were better than after the older method by scissors or the knife. The only disadvantage appeared to be the risk these patients seemed to run of getting broncho-pneumonia after diathermy. Of those who survived the short period after the operation, 50 per cent. had a good chance of remaining free for six years. (He had first used the method six years ago.) Secondary hæmorrhage after the operation he regarded as a bugbear. In 84 cases of carcinoma of the tongue he had only had two cases of such hæmorrhage; one was easily controlled; in the other the lingual artery had to be secured. And in inoperable malignant growths of the mouth diathermy was most useful. He had also used diathermy for malignant growths of the bladder.

Mr. JOHN EVERIDGE said the diathermic cautery possessed enormous advantages for the treatment of papilloma of the bladder, and the results it gave were quite good. Recurrences were frequent, which was not suprising, for only papillomata which could be seen were destroyed, and the tendency of the bladder to form these growths was unaltered. Sepsis in the bladder did not tend to occur after the method. Secondly, hæmorrhage took place with considerable frequency and there was often a fair amount of bleeding at the end of the first week, but he had not yet had a case so treated which caused him any great anxiety. In the treatment of carcinoma of the bladder by the diathermic cautery, however, the story at his hospital was a different one, for most of the cases seemed to have been the worse for it. Indeed, in cases of doubtful diagnosis as between carcinoma and papilloma, the cautery usually made the nature of the lesion clear, for carcinoma was not benefited. Forage for prostatic enlargement had been found very valuable where there was a projection into the prostatic urethra causing urinary obstruction. It was not so good for massive enlargements. The absence of scar tissue after operation was of peculiar importance in the neck of the bladder and this constituted another recommendation for diathermy.

Mr. PHILIP TURNER spoke of his use of fulguration for malignant growths with Dr. Iredale in 1909 after he had visited the Surgical Congress in Paris in 1908. Later they had found diathermy superior to fulguration. Rodent ulcer was the type of lesion which yielded the best results. In addition to the diseases mentioned in the discussion diathermy had been

valuable for cases of breaking down tuberculous glands in the neck with sinuses, for it brought about firm healing and he was able to support the statements as to the absence of pain and shock and the formation of supple scars after diathermy. In his 18 years' experience with it he had had only three burns, and four cases of secondary hæmorrhage. He always took care that no ether was in the theatre where diathermy was performed. For malignant growths in the mouth and pharyngeal region the method was particularly valuable, as it enabled the mutilating operations—which were so frequently disappointing—to be dispensed with. He had employed colloidal copper for the purpose of guiding the diathermy current accurately along the lymphatic tract, and had found it distinctly useful when the neck glands were involved.

Mr. C. G. TEALL referred to the use of diathermy for treating growths in the œsophagus, a region where it had long been considered dangerous to use it. In association with Mr. Musgrave Woodman he had used a specially designed electrode constructed of metal only where it was intended to act on the growth, the remainder being of vulcanite; it answered very well for palliative treatment. More recently they had used a modification of the Jackson bougie.

Mr. C. P. LANKESTER spoke of his treatment of hæmorrhoids by diathermy and the almost entire absence of pain.

Reply.

Dr. CUMBERBATCH, in reply, said that after carrying out circumvallation, pieces of tissue could be excised for microscopical examination without setting up metastasis such as many considered likely when that was done in the ordinary way. In Baltimore both Howard Kelly and Joseph Bloodgood had now discarded the knife for accessible malignant growths. Experiments in diathermy on vegetables were not of much use for deducing principles in regard to a patient's living tissues. It had not been the experience at St. Bartholomew's Hospital that broncho-pneumonia often developed afterwards. He thought diathermy ought to receive a thorough trial in the treatment of carcinoma of the cervix. Dr. Henry, of Omaha, preferred diathermic coagulation in early cases of carcinoma of the cervix to hysterectomy. By using the proper technique burns could be avoided, whilst ligation of arteries prevented secondary hæmorrhage.

Mr. STEWARD, in a brief reply, said he was glad his pessimism about the use of diathermy in lesions of bone was apparently not well founded. The general situation, good as it already was, could be expected to improve yet further with careful observation and better technique.

ROYAL ACADEMY OF MEDICINE IN IRELAND.

SECTION OF MEDICINE.

A MEETING of this Section was held on Dec. 3rd, Dr. G. E. NESBITT, the President, in the chair.

Dr. R. H. MICKS and Dr. W. R. FEARON described a case of

Hæmatoporphyrinuria.

They stated that the urine was a deep port-wine colour and showed no absorption bands. By adding 10 per cent. barium chloride solution, drop by drop, to boiling urine the pigment was carried down with the precipitate of barium salts, and removed from the precipitate by extraction with glacial acetic acid, or with a 5 per cent. solution of sulphuric acid in 90 per cent. alcohol.

Dr. R. R. LEEPER said that the patient from whom the urine was obtained was a man who had been under his care for some years. He suffered from dementia præcox, and was cyanosed in the extremities. One night he suffered from retention of urine; Dr. Leeper drew off the urine, and found hæmatoporphyrinuria. The patient had had no drug treatment.

Dr. L. ABRAHAMSON said that he assumed the hæmatoporphyrinism in this case to be of the acquired variety, as the cause was not apparent. He referred to four cases he had reported in the *Quarterly Journal of Medicine*, two of which were of the acquired type, and two congenital.

Dr. A. R. PARSONS referred to a case of hæmatoporphyrinuria described by him in 1906.

The patient, a woman of 23, complained of very severe abdominal pain, constipation, and sleeplessness, for which there was no apparent cause. The urine was generally normal when passed, but later changed colour and became the colour of port wine. The patient had had no drug treatment whatsoever. She recovered and left hospital, but about a month later she returned much worse. She developed symptoms of peripheral neuritis, and died some time later. Alkalis were given freely, but without any benefit.

Dr. W. M. CROFTON and Dr. PRESTON BALL joined in the discussion.

Dr. E. T. FREEMAN described a case of

Chronic Gastric Ulcer.

The patient, aged 45, was a professional man who for seven years had had abdominal pain, which was worse in the summer and early autumn, when he was in the habit of eating much fruit. In September, 1925, the pain had been more severe than usual, and he complained of pain over the ensiform cartilage and inability to walk, stand, or sit up without discomfort. There was slight tenderness in the mid-line, but the gall-bladder was neither tender nor palpable. The patient looked slightly jaundiced, and had bradycardia (pulse-rate 58). The teeth were excellent, and there was no obvious infection of tonsils. A fractional test-meal showed hyperchlorhydria and some leucocytes and blood-cells. A radiogram showed an ulcer on the lesser curvature, with a large crater towards the pancreas, slight pylorospasm, and duodenal irregularity. The urinary diastase was 8 units, and the van den Bergh test gave a very faint indirect reaction not more than normal.

The ulcer, said Dr. Freeman, was of the type for which surgical intervention was usually suggested, and for which gastro-enterostomy would be useless, as the pylorus emptied normally. The patient was put on a rigid diet—milk and cream every hour, with alkaline powder between, and ℥ xx of tincture of belladonna ex aqua each night. Eggs, ground rice, bread-and-butter, and vegetable purées were gradually added. At the end of three weeks he was allowed fish, and was then taking three small meals daily, with milk and cream and alkalis between. He had now been on an almost normal diet for some months, with alkaline powder and cream mixture. He was not allowed to eat a greater total quantity than 12 oz. at any meal. Radiograms taken during October and November showed no ulcer, and the patient had had no symptoms since the second day of treatment. Great credit was, however, due to the patient for his complete coöperation. The aphorism attributed to Sir J. K. Fowler that no fool was ever cured of pulmonary tuberculosis might be applied to gastric ulcer.

Dr. MICKS referred to a paper by Einhorn and Crohn, of New York, describing 101 cases of gastric ulcer treated medically during the last four years. They stated that after a year about 80 per cent. appeared to be cured, but that after four years only about 50 per cent. of the cases treated had not relapsed. He thought that in the average working-class patient this was the most that could be hoped for.

Dr. J. H. POLLOCK read a paper entitled

Observations upon Scarlatina.

He discussed the frequency of hæmolytic streptococcal infection, as shown by blood cultures and metastatic abscess formation. He believed that a streptococcal septicæmia was very frequent.

The PRESIDENT said that he had used antitoxin to some extent at the Richmond Hospital, but it was expensive, and he could not say that it had had any remarkable effect in his cases—nothing at all comparable to the effect of diphtheria antitoxin.

Dr. CROFTON said that English workers had for years maintained that a streptococcus was the cause of scarlatina.

Dr. W. E. HUTCHINSON said that he had been at Cork Street Hospital for a year while cases of scarlatina

were being treated on the ordinary lines. After that time the use of serum had come in, and he had no doubt from a comparison of the results that serum should be used. He mentioned one case which on admission had been absolutely comatose. 10 c.cm. of serum were given that night, and the same amount the next morning; recovery was uninterrupted. He could not be sure whether the giving of serum lessened the complications that arose in cases of scarlatina.

Dr. R. J. ROWLETTE asked if all the cases treated were cases of true scarlatina, or if they were cases of sepsis simulating scarlatina. It was important to make a definition between cases of true scarlatina and cases of acute sepsis with a rash. He asked if the use of vaccines made from the organisms which were separated from the blood had been tried. He thought that probably an autogenous vaccine would be more helpful than serum, and that vaccine and serum together would be more helpful than either serum or vaccine used alone.

Dr. POLLOCK, in replying, said that they had found at Cork Street Hospital that the giving of serum did not make any difference regarding the length of time of convalescence. He thought it possible that, as time went on, scarlatina would be regarded much less as a separate entity than it had been considered recently; he also thought that the nomenclature of many of the fevers would be changed in the future.

Dr. W. G. HARVEY showed a case of lichen planus acuminatus and lichen annularis.

Dr. ABRAHAMSON read a paper on the diagnosis of coronary thrombosis, and a discussion followed.

EDINBURGH OBSTETRICAL SOCIETY.

A MEETING of this Society was held on Dec. 8th, Prof. R. W. JOHNSTONE, the President, being in the chair.

Prof. J. A. KYNOCH described two cases of

Rupture of Uterus following Cæsarean Section.

The two cases, he said, had been met with within two months.

CASE 1.—The patient had had two Cæsarean sections, and was again nearly at full term. The clinical features were severe collapse, preceded by several hours of abdominal pain and sickness, during which time the patient had walked several miles in search of work. Operation was performed immediately on admission, and an aperture about the size of a five-shilling piece was found at the lower end of the scar, which was thin and translucent for its whole length, the peritoneal coat being alone intact. There was a considerable quantity of free blood in the peritoneal cavity. Supravaginal hysterectomy was performed, and the patient left hospital three weeks after admission.

CASE 2.—The patient also was eight months pregnant, and had had one previous Cæsarean section. She was suddenly doubled up with pain, and had a fast pulse and hurried respirations, the rupture being complicated by an acute lobar pneumonia. Rupture was diagnosed and the abdomen opened under local anæsthesia. The rupture was found to be five inches in length and the membranes bulged through. After removal of a dead child, the wound was sutured and the patient sterilised. After a somewhat stormy convalescence, owing to the chest condition, the patient eventually did well, and was discharged four weeks after operation.

Prof. Kynoch went into the statistics of rupture after a previous Cæsarean section, and contrasted the results of the classical and lower uterine segment incisions. The most frequent causes of rupture, he said, seemed to be infection with defective coaptation of the wound edges, the use of catgut as a suture material, and attachment of the placenta to the line of the incision. Both of his cases had had a febrile convalescence at the previous Cæsarean section, and in each case catgut had been employed. Prof. Kynoch favoured silk as a suture material for Cæsarean sections, and thought catgut very unsuitable.

Dr. C. G. LAMBIE read a paper on

Diabetes and Pregnancy,

which were rarely associated, he said, because diabetes caused atrophic and sclerotic changes in the ovaries and uterus, with resulting sterility, disorders of menstruation, and sexual frigidity. These functional disturbances could often be rectified by the use of insulin, except where organic changes were advanced, as in the more chronic cases.

Referring first to the effect of pregnancy upon diabetes, Dr. Lambie said that pregnancy exacerbated pre-existing diabetes, and might be the starting-point of the malady in predisposed individuals. The factors leading to deterioration of sugar tolerance were: (1) absorption of products of protein hydrolysis from the placenta during the first three to four months—a condition analogous to infection; (2) the emotional excitability of the earlier months, causing glycogenolysis in the liver; (3) over-eating, after the period of morning sickness was over; (4) the necessity for giving a good deal of carbohydrate to prevent acetonuria; (5) hyperactivity of the thyroid and pituitary glands during the later months. Improvement in tolerance was commonly observed towards the end of pregnancy, while simultaneously an increasingly large amount of carbohydrate was utilised by the fœtus. The islet tissue of the fœtus underwent marked hyperplasia and hypertrophy to meet the increased functional demands. There was no good experimental evidence that insulin passed from the fœtus to the mother. During labour the blood-sugar rose slightly, but after delivery there was a sharp rise, the hyperglycæmia lasting for 24 to 48 hours. Thereafter an improvement in tolerance occurred, and might be accompanied by hypoglycæmia in cases treated with insulin. This was due either to a return of pancreatic function, or to excretion of carbohydrate as lactose on the milk, or to replenishment of the glycogen reserves after their depletion during labour, in which case it might be quite short-lived and was followed by another fall in tolerance, after which there might be gradual improvement. Acetonuria during labour was due to depletion of the glycogen reserves in order to provide carbohydrate for the supply of energy for muscular contraction or to anæsthetics, starvation, hæmorrhage, or sepsis. After delivery, the tendency to acetonuria disappeared, more fat could be taken, and the necessary calories might be given with a smaller intake of glucose.

Turning next to the effect of diabetes upon pregnancy, Dr. Lambie said that both maternal and fœtal mortality were high. Hyperglycæmia in the fœtus, which was secondary to maternal hyperglycæmia, resulted in hydramnios, the development of an excessively large fœtus, and hyperplasia of the islets of Langerhans in the fœtal pancreas. Hydramnios might be caused by fœtal diuresis together with endosmosis, due to high osmotic pressure of the saccharine fœtal urine. Hypoglycæmia, due to excessive insulin secretion by the hyperplastic islet tissue, was a possible cause of death after birth. These conditions, with their associated obstetric complications, were avoided by the use of insulin. Insulin also raised resistance to infection and diminished susceptibility to puerperal sepsis.

Diabetes, he continued, had to be distinguished from other forms of glycosuria occurring in pregnancy—namely, early alimentary glycosuria, renal glycosuria, lactosuria, glycosuria due to carbohydrate starvation, and late alimentary glycosuria. The last might closely resemble diabetes, and was liable to similar complications. Its most outstanding feature was its rapid disappearance within about 10 days of delivery. It was probably of hypophyseal origin. In some cases hyperthyroidism might be a cause of glycosuria. Insulin had improved the prognosis, especially as regards the life of the mother. Some cases now passed through pregnancy without loss of tolerance; pregnancy might go on to full term and a healthy child might be born. The diet must contain a relatively high proportion of carbohydrate in order to avoid acetonuria. After delivery a high-fat low-carbohydrate diet might be given, and it then became possible to reduce or abolish the dose of insulin. The caloric requirements were about

35 calories per kg. per diem, and the protein minimum was approximately 1·2 g. per kg. per diem. Insulin was administered in the usual way, and did not harm the fœtus, even when minor attacks of hypoglycæmia occurred.

Induction of abortion was indicated, said Dr. Lambie in conclusion, (1) where diabetes had existed prior to pregnancy and the patient was unwilling to submit to continuous supervision under suitable conditions; (2) in very emaciated, ill-nourished subjects; (3) where there was rapid loss of tolerance in spite of treatment; and (4) in cases of acidosis with uncontrollable vomiting. Where a large fœtus was expected, premature labour might be induced, or Cæsarean section under nitrous oxide and oxygen anæthesia might be performed. Labour was best conducted under hyoscine and morphine narcosis. During labour usual doses of insulin, together with a very liberal allowance of easily assimilable carbohydrate, should be given to prevent acidosis.

Reviews and Notices of Books.

TREATMENT.

The Elements of Medical Treatment. By ROBERT HUTCHISON, M.D., F.R.C.P., Physician to the London Hospital and to the Hospital for Sick Children, Great Ormond-street, London. Bristol: John Wright and Sons, Ltd. 1926. Pp. 163. 7*s.* 6*d.*

Principles of Medical Treatment. Sixth edition, revised and enlarged. By GEORGE CHEEVER SHATTUCK, M.D., A.M., Assistant Professor of Tropical Medicine, Harvard Medical College. Cambridge: Harvard University Press. London: Humphrey Milford, Oxford University Press. 1926. Pp. 252. 15*s.*

IT is admittedly difficult for the student in the wards to learn much about treatment; most of his time is occupied with case-taking and diagnosis, and if he is really interested in treatment he has to consult large volumes. Dr. Hutchison's excellent book should remove some of his difficulties, for it sets out in elementary form the basic principles of treatment and their application to the commoner types of disease. An introductory outline in 11 pages contains more wisdom than many a large text-book of therapeutics. Then follow chapters devoted to such subjects as fever, pain, insomnia, constipation, &c., and after this certain definite diseases such as nephritis, bronchitis, pneumonia, &c., receive attention. A chapter on psychotherapy has been written by Dr. T. A. Ross; sections on diabetes and the use of insulin and an account of some minor medical operations are contributed by Dr. Devereux Forrest. Throughout the book prescriptions are not only set out in full, but also each ingredient is clearly explained, and the advice given in the introduction "to use only a few drugs but to know them and their effects intimately," should be easy to follow if this book has been intelligently read. It should make a wide appeal to students, resident medical officers, and young practitioners, for the advice it contains is sound, free from fads, and not overburdened with useless detail.

In its sixth edition Dr. Shattuck's book has been considerably enlarged and revised, many authors now contributing special sections. The chapters on asthma, syphilis, lead poisoning, anæmia, endocrine disturbances, pre-operative and post-operative medical treatment, and on vaccine therapy are entirely new. Dr. Shattuck is also a firm believer in the habitual use of only a few drugs; and in a masterly chapter on medication he sets out two lists, the first containing 11 "very valuable drugs," and the second some 15 groups of "useful drugs." The 50 pages which make up this chapter are as valuable as the whole Pharmacopœia. English readers should not be put off by the fact that the references are mostly to official and non-official American preparations, for this does not affect the value of the advice offered.

RHEUMATISM: ITS MEANING AND ITS MENACE.

By LEWELLYS F. BARKER, M.D., and NORMAN B. COLE, M.D. London and New York: D. Appleton and Co. 1926. Pp. 165. 5*s.*

IN this little volume an attempt has been made to present to the public the facts about all forms of arthritis (including gout), as they are, however imperfectly, known to the medical profession. The book supplies a good summary of the subject; the practitioner also will profit by its perusal because it will fortify him anew against the employment of pseudo-scientific theories in treatment, upon which intractable cases are always tempting him to rely. Two of the first three chapters deal with rheumatic fever and its complications, laying stress, of course, upon the preventability of rheumatic carditis as a national disease. A word should here be said as to the use of the word "infectious," which American writers apparently use as synonymous with our word "infective," as applied to this disease. Chronic arthritis is subdivided into (1) chronic infectious (i.e. infective) arthritis; (2) chronic progressive polyarthritis; and (3) primary hypertrophic osteo-arthritis. These conditions are described in detail in three successive chapters. Primary hypertrophic osteo-arthritis is stated not to be "a sequel of infection in other parts of the body in the same sense as" are the other two forms. The next chapter is about treatment of all three forms, in all of which the removal of any infective cause and the prevention of crippling processes are put forward as the ideal. Drugs are not considered by the authors to be efficacious in any specific way, and hot water is stated to be the cause of the favourable reports from spas. The fads of dietotherapists are to be discouraged, and a commonsense mixed diet under the supervision of the family doctor is advocated. No alleged short cuts to cure are credited by Dr. Barker and Dr. Cole, who write with a real sense of professional responsibility. A chapter on gout is followed by another pointing out the social significance of the rheumatic diseases in general; it is noted that as a result of these diseases over 60,000 work-years are lost annually in Britain. A glossary is added for the convenience of the layman. As an experiment in education of the laity this book is of special interest. It will be instructive to learn whether it goes through many editions during the next few years or suffers in popular esteem from the absence of the plausible but wholly unscientific hypotheses which are so often the mainspring of books designed for the general public. We wish it success.

AVIATION MEDICINE.

By LOUIS HOPEWELL BAUER, A.B., M.D., Major, Medical Corps, United States Army; Commandant, The School of Aviation Medicine. Baltimore: Williams and Wilkins Company; London: Baillière, Tindall and Cox. 1926. Pp. xvi.+241 34*s.*

THIS book is divided into three main sections: I. The Selection of the Flyer; II. The Physiology of Aviation, including the Classification of the Flyer III. The Care and Maintenance of the Flyer. A supplement gives detailed instructions for certain tests and forms of examination in use by the U.S. Army and Navy Air Services, and a comprehensive bibliography is included. In Section I. the general physical qualifications required in an aviation candidate are set out, special reference being made to the eye, ear, nose, and throat. Neuropsychic factors and reaction times are considered in detail. Section II. deals with the effects of altitude upon the heart, respiratory, circulatory, and nervous systems, and various altitude tests which

have been devised are discussed. A chapter on the Effects of Wind, Cold, and Speed concludes this section. Section III. has chapters on Fatigue, Staleness, and Physical Fitness; Protective Devices; Duties and Training of the Flight Surgeon; Aviation Accidents; Dope Poisoning and Civilian Flying.

The author insists on the desirability of a separate medical service consisting of specially trained medical officers for an air service. He points out that the medical officer associated with this service needs a considerable amount of training. He has to learn to conduct the selection examination, to carry out the altitude test, and to superintend the maintenance of physical and mental health of the airman from his knowledge of the possible effects of a peculiar environment. The standard of normality demanded of airmen in America is evidently not very high. For example, the advisability of accepting a candidate for flying who has "... at least 75 per cent. mobility of the knee-joint; 50 per cent. mobility of the ankle-joint..." is open to doubt. A candidate suffering these degrees of limitation of joint movement would probably not be able to keep himself fit by taking part in games and exercises, the necessity of which is rightly stressed in a later chapter. In the consideration of blood pressure in a candidate the systolic pressure alone is here mentioned; nothing is said of the significance of the pulse pressure, which is considered by many to be of greater importance.

It is clear that there is still much work to be done in the assessment of fitness for flying, particularly in regard to reaction time tests and the effects of high speeds upon the airman. His ability to appreciate changes of motion from one plane to another is an important point difficult to estimate. Major Bauer has marked out clearly the ground that will have to be explored, and his modest volume is likely to be the forerunner of a considerable mass of literature as our knowledge increases.

SURGICAL TREATMENT IN OPHTHALMOLOGY.

Thérapeutique Chirurgicale Ophtalmique. By Prof. C. DUVERGER (Strasbourg) and Prof E. VELTER (Paris). Paris: Masson et Cie. 1926. With 40 plates, mostly coloured. Pp. 480. 18*s.* 4*d.*

SOME six years ago [1] we reviewed a book in which Dr. Duverger advocated local anæsthesia by deep injection into the region of the nerves supplying the part with sensation; for enucleations and nearly all intraocular operations in which the instillation of drops is insufficient, deep injection into the region of the ciliary ganglion was recommended. He and his collaborator now lay further stress on the advantages of this technique, and fully explain its detailed application in all lid and plastic operations, in excision of the lacrymal sac when injection of the infraorbital nerve canal as well as the nasal nerve is performed, and even in such major operations as the removal of retro-ocular orbital tumours. General anæsthesia, they declare, has scarcely a place in ophthalmic surgery, almost the only patients for whom it is called for being young children and cases of grave infection such as orbital abscess. They contend that inflamed eyes can be rendered completely insensible by their methods. As this doctrine is contrary to that generally taught in this country, this section alone makes the book worthy of study by ophthalmic surgeons. The other sections are no less interesting, the illustrations being throughout excellent. Descriptions of innumerable lid operations are often wearisome or difficult to follow, but here the number of operations described is strictly limited, and the illustrations make the accounts abundantly clear. The authors do not profess to include all the operations of ophthalmic surgery but merely the ones which they themselves recommend or have adopted. For instance, we can find no reference to "epithelial inlays" and "outlays" for plastic operations, to intracapsular extraction of cataract either by Smith's or by Barraquer's method, and to many other operations which might have been included. On the other hand, such unusual and difficult procedures as amputation of the anterior segment of the eye, exenteration of the orbit and the formation of a new socket for an artificial eye are fully illustrated. The views expressed are individual but none the less interesting. No operation is described for conical cornea, because the authors do not recommend any. For glaucoma the operations of Lagrange and Elliot (spelt "Elliott") are both illustrated, and, as is perhaps to be expected in a French book, the former is recommended as on the whole the better though not the easier. As a supplement to enucleation the implantation of a glass ball is condemned, while that of a piece of ox's cartilage is recommended. The book may well find a place on the shelves of any ophthalmic surgeon in England who desires to keep up with the best foreign work in his specialty.

[1] THE LANCET, 1920, ii, 355.

RETROBULBAR NEURITIS OF NASAL ORIGIN.

Rhinogene Neuritis Retrobulbaris. By Prof. Dr. J. MELLER, Chief of the University Eye Clinic; and Dr. OSCAR HIRSCH, Tutor in the University, Vienna. Berlin: S. Karger. 1926. Pp. 62. M.4.80.

Dr. Meller's object in writing this essay is to maintain the thesis that retrobulbar neuritis can be caused by so slight or evanescent a grade of inflammation in the accessory sinuses of the nose as to show to the rhinologist no sign of disease, even on the most thorough examination. He believes further that, in disseminated sclerosis, the special susceptibility of the optic nerve is caused by its proximity to the accessory sinuses and, therefore, that the retrobulbar neuritis of this disease is in reality of nasal origin. It follows that he insists on rhinological treatment, in the absence of all signs of intranasal disease, in cases where a most careful examination of every possible cause has been fruitless. Treatment is not necessarily operative, for he quotes Herzog's recommendation of "continuous ischæmia" of the nasal passages, obtained by applying adrenalin-soaked pledgets of cotton-wool to the middle meatus every two hours, instancing the case of a 22-year old girl with left-sided retrobulbar neuritis, stationary for three weeks, who recovered after applications twice daily for three days. Dr. Hirsch devotes a large part of his contribution to other orbital complications of sinus disease, but his main object is to support Dr. Meller's thesis. He refers to cases in which the mucosa of the ethmoid was found at operation to be œdematous, although the nasal passages appeared perfectly healthy, and to others where microscopical examination of the mucous membrane lining the sinuses showed inflammation, although it seemed macroscopically to be normal.

Although it is possible that the authors do not allow sufficient weight to the numerous cases of retrobulbar neuritis which recover spontaneously, their arguments are well marshalled and deserve attention from oculists and rhinologists alike.

DISEASES ASSOCIATED WITH HIGH BLOOD PRESSURE.

Die Hypertoniekrankheiten. By Dr. ESKIL KYLIN, Director of the Military Hospitals and of the Inpatient Departments of the District Hospitals, Eksjo, Sweden. Berlin: Julius Springer. 1926. Pp. 168. Mk.8.40.

DURING the last nine years Dr. Kylin has been working on blood pressure and its variations in renal disease, and on changes in amount and composition of the blood in diseased states. All the important evidence derived from these studies, and those of numerous other writers, is collected in this compact book. Kylin calls attention especially to recent advances in our knowledge, and shows how our whole conception of the subject of blood pressure is being revolutionised by new work on capillary tension, peristaltic action in the capillaries, and

glomerulonephritis. He discusses the methods of estimating arterial blood pressure and its normal variations, and gives a table of the average blood pressures in the various decades of life, based on a large number of cases. According to this table, the average arterial blood pressures between the ages of 15 and 40 vary only between 115 mm. and 121 mm., and the average maximum systolic pressure between 132 mm. and 170 mm. for the same period. Two methods of measuring capillary pressure are described. The first is a bloodless method, using a convenient manometer devised by him, which is light to handle and can be used with any microscope. The other method consists of tubes of known calibre into which the blood is allowed to flow from the capillaries. The results of the author's investigations of the capillary pressure in the prenephritic stage of so-called acute glomerulonephritis lead him to the conclusion that this disease is primarily vascular; this conception has not yet received general acceptance. An important section of the book is devoted to "Essential Hypertonia," symptomatology, and variations in the blood calcium, potassium, cholesterin, and adrenalin being set out. The last chapter is concerned with the ætiology and symptoms of permanent hypertonia. Throughout the book Dr. Kylin tends to emphasise ætiology and pathogenesis rather than treatment, short discussions of the prevention of acute glomerulonephritis by treating sources of infection, and of the treatment of permanent hyperpiesis by diet and other methods are, however, included.

THE ABDOMEN IN LABOUR.

By NORMAN PORRITT, M.R.C.S., L.R.C.P. Lond., Consulting Surgeon, Huddersfield Royal Infirmary. London: Humphrey Milford, Oxford University Press. 1926. Pp. 76. 5*s*.

THIS little book is a reprint of the essay which was awarded the Sir Charles Hastings clinical prize of the B.M.A. in 1926. The prize is awarded for work carried out by a general practitioner. In his essay, the chief object of the author is to point out the advantages of abdominal over vaginal examinations for diagnosis, during labour, and in this he succeeds admirably. Particularly good are the remarks on inspection of the abdomen. There are a few obvious errors, much of the argument used in favour of the dorsal position appears illogical, and the illustrations are rather difficult to understand, but the book contains much that should be useful both to teachers and students.

PHYSICAL CHEMISTRY IN BIOLOGY AND MEDICINE.

By J. F. MCCLENDON, Ph.D., Professor of Physiologic Chemistry at the University of Minnesota Medical School; and GRACE MEDES, Ph.D., Assistant Professor of Physiologic Chemistry at the School. London and Philadelphia: W. B. Saunders Company. 1925. Pp. 425. 21*s*.

THIS volume is divided into two sections, "Physico-Chemical" and "Physiologic." Part I. opens with a three-page chapter on the concept of mass, followed by a five-page account of the structure of the atom. Of these five pages two are taken up with diagrams and two with tables. The net result is a wholly unintelligible summary of mass and the atom. The other chapters of this section are not much better. In the second section the first chapter is entitled Radiant Energy. In eight and a half pages the nature of radiant energy, the quantum theory, photosynthesis, actinotherapy, and bioluminescence are dealt with. The reader is then led through atomic structure and physiological action, thermo-chemical considerations, colloids, and ionic equilibria in blood in quick time. The recent nomograms of L. J. Henderson are included in the last-mentioned section. The authors' knowledge of the literature, and particularly of out-of-the-way publications, is evidently great, and it is regrettable that this work, which must have caused them considerable labour, gives such a disjointed picture as to be unreadable. Physical chemistry has never been a popular subject with medical workers, and a study of this book is not unlikely to turn them from it for ever. Not only the paragraphs, but even the sentences lack continuity. The authors pass from erythrocytes abruptly to sea-urchins' eggs, jumping off to the freezing-point of various types of coctus, with the result that a state of mental nystagmus is produced in the reader's mind.

THE ORIGIN OF MAN.

The Pedigree of the Human Race. By H. H. WILDER, Ph.D. London: G. G. Harrap and Co. 1926. With 113 figures. Pp. 368. 12*s*. 6*d*.

THE author of this book is professor of zoology in Smith College, Massachusetts. He gives us here a plain and very readable account of what we know and what we may surmise of the ancestry of the species *Homo sapiens* and of its several varieties. The suborder anthropoidea of the primates includes Tarsius (the little nocturnal arboreal animal from the East Indies, of which so much has been lately made in the discussion of human origins), the marmosets, the ordinary monkeys, and finally the family Hominidæ, which contains the gibbons and siamangs, the higher apes, and man. Prof. Wilder is firm in stating that there are no grounds more valid than human pride and prejudice for separating man into a different zoological family from the orang-outans, gorillas, and chimpanzees. One is surprised to learn how much of the detailed anatomy of these apes is still unknown, and the detailed dissection of the different varieties of man is a promising field, which needs exploration. Of extinct forms we have *Homo neanderthalensis* (which Virchow thought was a deformity, but whose existence as a constant type has now been fully established) and *H. heidelbergensis* as species of man, and Du Bois's *Pithecanthropus* from Java, Dart's *Australopithecus* from South Africa, and the Piltdown *Eoanthropus*, representing the human strain or something near it after its divergence from the line which has led to the apes. The book illustrates one aspect of zoological progress which is apt to cause difficulty to those who are not specialists, though Prof. Wilder tides us gently over the changes of names which terminological exactitude requires; the gorilla is still *Gorilla*, but the orang-outan is *Pongo*, and the chimpanzees are *Pan*. The names are in themselves so attractive that we are reconciled to them as easily as we can take to calling *Amœba proteus* by the name of *Chaos diffluens*. It is to be hoped that the author will be able to find Miss Harriet Andrews; she certainly deserves to be thanked for the charming picture on p. 76.

GOITER AND OTHER DISEASES OF THE THYROID GLAND.

By ARNOLD S. JACKSON, M.D., Jackson Clinic, Madison, Wis. London: Humphrey Milford; New York: Paul B. Hoeber. 1926. Pp. 401. 50*s*.

THIS very complete book is written mainly from the point of view of American work, but can confidently be recommended as an up-to-date presentation of the subject. The author disagrees with the theory that colloid goitre represents the resting stage of the gland following stages of hypertrophy and hyperplasia; like Plummer he believes that colloid goitre represents an active stage of the gland, and arises because under certain circumstances—i.e., during rapid growth, the thyroxin in the tissues becomes exhausted. Consequently the gland becomes overworked in trying to make up the deficiency, and lags behind the demands of the body for thyroxin, secreting colloid, which is stored in large quantities. The author, of course, advocates operative procedures for toxic goitre, and the detailed description of his technique is one of the most valuable parts of the book; but a very useful chapter on substernal thoracic goitre is given, and its diagnosis by X rays

is illustrated. Plummer's treatment of hypothyroidism by intravenous thyroxin in doses short of 15 grains (the normal quantity in the body) is described. Dr. Jackson points out that by oral administration alone it is impossible to make up the loss that the body has sustained. The book is largely a compilation of other people's experiments and results. In a monograph on this subject by a prominent worker we would have expected his own cases to have been considered in rather greater detail. The book might quite well have been condensed and the bibliography further enlarged, since several authors are mentioned in the text to whose work no reference is given. The photographs of patients and of pathological and microscopical material are good.

SYNTHETIC ANATOMY.

By J. E. CHEESMAN. Part I., The Upper Arm and Shoulder; II., The Forearm; III., The Hand. London: Baillière, Tindall and Cox. 1926. Each Part with index and instructions. 2*s.* 6*d.*

THIS is a new and ingenious presentation of anatomical details by a series of transparencies, accurately adjustable on each other, which thus afford a complete idea of the limb built up on its skeleton. Conservatism may lead a teacher to look askance at seemingly iconoclastic methods of inducing the student to grasp and remember the relations of the structures with which he deals, but these pictorial transparencies deserve careful examination. We know of students who have found much help from them, and on general principles any reliable method of instruction which might make the learner think of anatomical structure in terms other than those of formal description is to be welcomed; too many students look on anatomy as the subject of a book, rather than as the structure of the body. The drawings are pleasing, especially where the skeleton comes into the exhibited plane. The treatment is conventional, in the sense that there is no claim to represent actual dissection, and such things as subcutaneous vessels and nerves are shown in purely schematic manner. We have found no errors in the presentations, though the amount of detail given is surprising. The upper limb only has appeared so far, the hand being of natural size; the student can enlarge the whole or part of any drawing, or make use of any combinations he pleases. The transparent media, colours, and adjustments are excellent, and each index is given in both terminologies. The issue of the remaining parts will be awaited with interest.

Reports and Analytical Records.

PARA-THOR-MONE, LILLY.

(ALLEN AND HANBURYS, LTD., BETHNAL GREEN, LONDON, E.)

PARA-THOR-MONE is an active extract of parathyroid glands of cattle prepared, under the authority of the University of Alberta, according to a method elaborated by Prof. J. B. Collip. It is a stable aqueous solution of the active principle (or principles) standardised by its capacity to increase the total blood-serum calcium in normal dogs. One unit is defined as one-hundredth part of the dose required to cause an increase of 5 mg. of calcium in the blood serum of a 20 kg. dog, 15 hours after injection. Para-thor-mone is regarded as a true specific in cases of tetania parathyreopriva, and has relieved the symptoms of idiopathic and infantile tetany. Its use has been attended with beneficial results in some cases of arterial hypertension, in tropical sprue, and in the treatment of chronic ulcers and ulcerative colitis; it has been tried in chorea, epilepsy, and conditions of protein sensitisation, such as asthma and hay-fever. In clinical cases as much as 100 units have been given in 24 hours without ill-effect, but such a dose is unnecessarily large and should not be continued or repeated daily. In cases of well-marked tetany relief may be expected from 20–30 units, repeated two or three times within the first 24 hours and then diminished. Doses ranging from 10–25 units daily have been found to prevent recurrence of tetany in the chronic form of the condition. In infantile tetany a dose of 10 units is advocated. Para-thor-mone, Lilly, may be given subcutaneously, intramuscularly or intravenously, and is supplied in 5 c.cm. rubber-capped ampoule-vials containing 100 units.

ACETYLARSAN.

(WILCOX, JOZEAU AND CO., 15, GREAT ST. ANDREW-STREET, LONDON, W.C.)

Acetylarsan, as prepared at the Usines du Rhône, is an aqueous solution of a substitution product of benzene containing 23·6 per cent. of oxy-acetylaminophenylarsinate of diethylamine, and is regarded by a number of French authorities as a spirillicide practically equal in activity to arsenobenzene. The substance was chosen in the course of a search for an arsenical compound of high physiological activity, tolerated locally by the tissues; acetylarsan can be injected either beneath the skin or into the muscles without causing any pain whatever. Laurent, Chatelier, Gougerot and Lacapère, among others, have conducted tests under controlled conditions showing immediate disappearance of the treponemata after administration of this drug, rapid evolution of the cutaneous phenomena and characteristic serological reactions. The solution, which is neutral, colourless and limpid, contains arsenic in the proportion of 0·05 g. per c.cm. The dose tolerated by mice is 20 cg. per kg., by rabbits 40 cg. For a man of average weight a dose of 1·15 g. may be administered in one injection without adverse reaction except in rare cases of idiosyncrasy. Elimination is rapid, often being complete in 36 hours, so that bi-weekly injection is possible if desired. A trial injection of 1 or 2 c.cm. is recommended before the weekly injections of 5 c.cm. are commenced, and the usual course lasts eight to ten weeks, by the end of which time ·10 g. of the salt will have been given. Herxheimer's reaction is practically unknown, but there may be nausea and possible vomiting 6–8 hours after the injection, and occasionally a slight brief rise in temperature. In the ordinary way the injections do not interfere with ambulatory treatment. Acetylarsan is supplied in boxes containing 10 ampoules each of 3 c.cm. A solution known as "infantile acetylarsan" is also supplied two and a half times weaker than the ordinary solution.

THORNE'S EXTRA SUPER CRÊME TOFFEE.

(HENRY THORNE AND CO., LTD., THE COCOA WORKS, LEEDS.)

We have received for examination samples of this toffee which is sent out in convenient sized pieces weighing above five to the ounce, each piece being separately wrapped in greaseproof paper. Analysis showed the following composition:—

Water	4·40 per cent.
Total ash	1·92 „
(Containing salt)	0·77 „
Fat	23·50 „
Protein	2·60 „
Sugar	67·58 „
	100·00 „

Calorie value per lb. .. 2294

This is a pure and palatable sweetmeat and contains somewhat more sugar than the older fashioned toffees of the Everton type. The salt present is very small in amount, and those who prefer this type of toffee will find it an excellent one of its class.

The Conduct of Medical Practice.

A Series of Articles by Experts dealing with the Difficulties Encountered in Professional Life and How to Meet Them.

XXVI.—CASES OF POISONING AND SUSPECTED POISONING.

BY G. ROCHE LYNCH, O.B.E., M.B., B.S.LOND., D.P.H.,

OFFICIAL ANALYST TO THE HOME OFFICE; DIRECTOR OF THE DEPARTMENT OF CHEMICAL PATHOLOGY, ST. MARY'S HOSPITAL; LECTURER ON FORENSIC MEDICINE AT WESTMINSTER HOSPITAL.

ONE of the most harassing predicaments of medical practice is the occurrence of some incident which leads to the suspicion that a patient is the victim of foul play—whether by interference with the treatment prescribed or by the addition of poisonous substances to food or medicine. Many suspicions of this sort are totally incapable of proof and, indeed, turn out to be entirely unjustified. Nevertheless, many practitioners of long standing can recall occasional cases where subsequent events have not served to abolish their doubts. Homicidal poisoning in this country is rare when contrasted with some tropical countries, such as India, but it must be remembered that the criminals are not always brought to justice. The intimate relations of the medical man with the patient and the household place him in an unrivalled position for close observation of suspected cases, and he is sometimes able to avert tragedy.

Statistics of Homicidal Poisoning.

From statistics of homicidal poisoning the following points stand out: (1) The motive is generally of domestic, passionate, or greedy origin. (2) 30 per cent. of homicidal poisoning occurs in towns and 70 per cent. in country places. This need not be taken to imply that there are more criminals of this type in rural districts, but rather that he is more likely to be found out, since his private affairs are known in greater detail by his neighbours. In other words, the poisoner stands a greater chance of successfully evading detection in town than in the country. (3) Successful poisoners often have more than one victim to their credit. (4) Mostly the crime is premeditated, and often great craftiness is displayed. (5) Far more males commit crime than females, but the percentage of females using poison is greater than males. (6) The fact that often homicidal poisoning is only discovered after an exhumation has been made, the original burial order having been granted on the authority of a medical certificate of death, shows the difficulties and responsibilities of the medical practitioner.

What is a Poison?

Poisoning may occur as a result of one of the four following circumstances: (1) Administration for homicidal purposes. (2) Self-administration for suicidal purposes. (3) Self-administration for a special purpose —e.g., abortion. (4) Accidental administration.

Before discussing these possibilities in detail it is pertinent to inquire what, from the forensic standpoint, constitutes a poison. It is, however, the *intention* to murder or harm which constitutes the crime; consequently the administration of substances not usually regarded as poisons may be poisons from the legal point of view if they are administered with evil intention. The sections of the Acts relating to poisoning determine the nature of the offence according to whether murder, grievous bodily harm, or injury or annoyance was intended. The law makes use of a variety of expressions, such as poison; noxious thing; destructive thing; stupefying or overpowering drug, matter, or thing, in order to make the statutes as comprehensive as possible. For example, 24 & 25 Vict. ch. 100, sec. 11, reads: "Whosoever shall administer or cause to be administered or taken by any person any poison or other destructive thing with intent to commit murder shall be guilty of felony." In the section dealing with the administration of chloroform, &c., for stupefying, whereby a felony can be committed, the words used are "chloroform, laudanum or other stupefying or overpowering drug"; in the statute dealing with abortion the words are "poison or noxious thing." Various judicial decisions, although clearing the legal position, have thrown great responsibility on the medical witness. It has been laid down that (1) there must not only be an administration of a noxious drug with guilty intent, but it must have been administered in sufficient quantity as to be noxious; (2) if a person administers with intent (in the particular case in which the ruling was made "to procure the miscarriage") something which as administered is noxious, he administers a "noxious thing." A distinction is to be drawn between a thing that is only noxious when given in excess and one which is recognised as a poison and known to be noxious and pernicious in its effect. The law does not make any distinction regarding the mode of administration. Administration hypodermically, by mouth, per rectum, or elsehow, of a poison with intent to murder or injure are punishable felonies. The only question that will be raised is whether the substance dealt with is noxious. Similarly also the admixture of cultures of micro-organisms or their toxins are equally poisons and have the same significance. The medical witness will have to decide whether a substance was noxious and whether it was given in excess, and into this consideration the age, health, tolerance of the victim will enter, and repeated administration of small doses may have to be considered.

The words grievous bodily harm require elucidation. It has been defined as the infliction of an injury which seriously interferes with health or comfort or both. It need not be permanent or dangerous.

How to Investigate a Suspected Case.

The method of approaching an investigation, when, from information received from a second person or from personal observation, suspicions are aroused that foul play may be occurring, require careful consideration. Suspicions, once aroused, soon assume formidable dimensions unless each incident is critically examined and a natural explanation sought, and rarely are they subsequently justified. During the two years subsequent to the mention of poisoned chocolates in the case of R. *v.* Armstrong numbers probably running into hundreds of samples of chocolates were submitted to analysts in this country alone; in only two or three cases was poison found, and in those cases the methods of tampering with the sweets were of the crudest nature.

When poisoning is suspected the physician should attempt to take apparently motiveless steps to circumvent operations by alteration of diet or the time of day at which food is given, in order to make things difficult for the suspected person. If medicines are suspected as being tampered with they should be changed, in such a way that a poison may demonstrate itself by taste or colour change; or a dye-stuff may be added so that the addition of an alkaline or acid substance would be seen. A nurse may be engaged or a previous nurse changed, and given strict orders to prepare food, but she should not be given a hint of what is going on. Visitation of the patient by a suspected person may be forbidden for ordinary medical reasons or only allowed in the presence of the nurse. The aim of the doctor should be not only to protect his patient, but also, if possible, to detect the poisoner, and thus prevent future attempts. If serious symptoms develop removal to a nursing home or hospital should be insisted on, so that the patient is out of reach of danger. Careful notes of everything that happens must be made at the time and kept for reference. Specimens of excreta likely to contain poison should be saved, especially those passed within 24 hours of

the time when the poison was suspected of being given. The doctor should himself carry them to his house and should keep them in a clean closed vessel, sealed and labelled. A brother practitioner should be called in consultation and suspicions communicated to him; in this way an independent witness is made available if required, and, moreover, the benefit of advice for future conduct of the case is obtained. Further than this it is impossible to go unless suspicions are supported by fact. Without provable facts it is impossible to set the machinery of the law in action. A communication to the police would at once start an elaborate investigation, questioning, and even perhaps detention of individuals; possibly a search of the house and probably publicity would ensue, all of which, unless the suspicions were correct, would at least inflict great hardship on innocent individuals. At worst it could lead to a possible action for damages against the medical attendant and the ruin of his practice should the suspicions be not subsequently confirmed.

When information is given to the doctor by a member of the household suggesting that a third person is attempting to poison the patient, the doctor should advise the informer to communicate with the police if sufficient proof is available. Probably the proof will be insufficient and no steps will be taken. The doctor should then invite the individual to coöperate with him in endeavouring to bring the allegation to a satisfactory termination, but he must at the same time be on his guard against false evidence actuated from interested motives and against an attempt of a guilty person to throw the blame elsewhere. The doctor must feel his way with the utmost caution, but he cannot afford to neglect the information. In such a case, if the patient is confined to his bed through illness, the doctor may with advantage urge removal to a nursing home or hospital.

In some cases the doctor may first hear of the suggestion of poisoning through the supposed victim (A), who will generally come armed with various articles of consumption believed to be poisoned. Such cases may be divided into the following headings: (*a*) suspected poisoning of (A) by (B), motive unknown; (*b*) suspected poisoning of (A) by a lunatic or borderline case or uncertifiable case—e.g., husband suspected by wife; (*c*) suspected poisoning of (A), a borderline case, by a relative; (*d*) suspected poisoning of (A) by a person interested—for example, financially—or by a companion likely to benefit. Regarding these conditions motive will have been found by the informant who believes that the poisoner has a grievance—e.g., love affairs, pecuniary reasons, and so forth. Generally speaking, these charges are without foundation, and incipient insanity of either party dependent on changes associated with involutional states must be borne in mind. The practitioner's duty here is simple. He will at once instruct the victim to collect material or excreta for analysis, or will arrange for the analysis to be made on the material already produced, at the expense of the victim, and advise the victim to wait for the result before action is taken by him or her. He will be prudent to get the needful fees for analysis in advance. If the victim is in a highly nervous state from worry, the practitioner should suggest his going away to friends until the result is known. When the result is known the victim may be satisfied that he or she is wrong or, what is more likely, will not be satisfied, alleging that the analysis failed to find some subtle poison. If the doctor cannot alleviate suspicion by persuasion he can but advise going to the police, but on no account should he take this step himself. If he knows of some reliable relative who will intervene, he should urge the patient to inform the relative so that a consultation may be held as to what steps are to be taken. Inquiry by the police will, of course, come to nought in that large majority of cases where no crime exists, but may result in satisfaction to the aggrieved party. The police will interview the doctor, who should give a full and unbiased opinion of the state of affairs as he sees them. If the doctor can satisfy himself that the aggrieved person is in an abnormal mental state, he may be well-advised to inform the person against whom the allegations have been made with a view to preventing possible assaults or retaliation, and possibly with a view to having the individual certified or provided with a nurse companion.

The Problem after Recovery.

The patient's recovery after accidental, suicidal, and self-administered poison does not necessarily end the problem for the family doctor. The doctor is often puzzled when a case recovers as to what is his duty regarding the lodging of information. Attempted suicide and the taking of poison for the purpose of abortion, for example, are felonies and are punishable by law. Technically, the doctor is an accessory after the fact if he fails to disclose what knowledge he is in possession of. But in how many cases is his knowledge founded on established fact? Further, what information he may have discovered will be hearsay or the statement of a person unsupported by witnesses, so that when he has to testify he may be met with a denial. One person's word against another, unsupported by corroboration, will not be accepted in a court.

Further—and this is the consideration that might have been put first—the doctor is bound by his professional obligations to his patient, whose faith in these obligations resulted in a confession which would not otherwise have been made. The point was dealt with at some length by the late Mr. Justice Hawkins, who fully realised the position of the doctor and made a pronouncement which is worth quoting in full:—

> "It was also said by the medical witnesses (referring to evidence given in the case) that, if in the course of professional practice they came across a case which indicated either that a crime had been committed or was about to be committed, under these circumstances they were bound to divulge it. To whom? To the Public Prosecutor! If a poor, wretched woman committed an offence for the purpose of getting rid of that with which she was pregnant, and of saving her character, her reputation, and, it might be, her very means of livelihood, and if a doctor was called in to assist her—not in procuring abortion, for that in itself was a crime—but called in for the purpose of attending her and giving her medical advice—that she might be cured so as to go forth to her business—he doubted very, very, very much whether he would be justified in going forth and saying to the Public Prosecutor, 'I have been attending a poor young woman who has been trying to procure abortion with the assistance of her sister. She is now pretty well, and is getting better, and in the course of a few days she will be out again, but I think I ought to put you on to the woman.' To his mind, a thing like that would be monstrous cruelty. He did not know what the jury's view would be; he spoke only of his own."

The judge is quoted only in connexion with cases of unsuccessful suicide, and of abortion, where the doctor has appeared in his professional capacity.

There is also the case where a person has purchased the poison and handed it to the poisoned person, who voluntarily took same—e.g., for procuring abortion. In absence of definite evidence of the fact the doctor can do nothing, but in the presence of positive evidence it may be his duty here to give information so that the accomplice may be apprehended, when the taker of the poison would probably become a Crown witness. In the case of a death pact between two persons by poison where one recovers, the doctor should inform authority, and the recovered person will probably be charged with felony.

The question of informing the convalescent patient of the nature of the illness will depend on the analyst's report. If positive, the patient must be informed of the nature of his illness, and if the evidence has been sufficiently strong to detain anyone, this fact must also be communicated to him. If, however, no action is likely to be taken against any suspected person, the suspicions had better not be communicated to the patient but further investigation left to his initiative.

The Cost of Analysis.

In cases of suspected homicidal poisoning whether the poison is known or not, the medical attendant should reserve specimens of excreta or partly consumed food for analysis. A difficulty arises regarding the cost of the examination. It is hardly likely that the suspected homicide will agree to pay for the analysis, thus providing evidence against himself, and, indeed, it may be impolitic to acquaint him of the fact that poisoning is suspected at that stage of the investigation. Any mention of the fact to the patient will also be equally undesirable, unless the patient himself suspects poison. The doctor is, therefore, faced with two alternatives: (1) To bear the cost himself, which is obviously unfair, as his chances of the recovery of the cost is remote, whatever the issue. (2) To inform the police and request them to take the necessary steps for an analysis. This, as has been already pointed out, will necessitate inquiries at a stage when the medical attendant desires to avoid them. There is, however, a third course which may assist the medical attendant in his difficulty. He may make application to the Under Secretary of State, Home Office, for assistance, giving a full account of the matter and the reasons for his suspicions. The Under Secretary of State may then cause an analysis to be made at the expense of public funds, if he thinks that the facts warrant it. The authorities at the Home Office, fully realising the delicacy of the doctor's position, can delay active inquiry into the case until the result of the analysis is known. Such an application should only be made in serious cases, but is a resort which may be of great assistance in an anxious situation. Should the Home Office consider that it is a case for their intervention they will inform the doctor of the necessary procedure.

What to Reserve and How to Reserve it.

It is obvious that every article of food or medicine which may be suspected of being tampered with should be reserved and kept under lock and key by the medical attendant. All excreta, urine, fæces, and vomit should be similarly treated, and especially those leaving the body within 24 hours of the time when the suspected poison was believed to have been taken. However, over-activity in suspected cases of the doctor may defeat its own object by putting the poisoner on his guard and causing anxiety to the patient. The doctor may have to be content with reserving one or two articles; positive findings in excreta are of greater value, as they prove the fact that the individual did actually imbibe poison. Generally speaking, the urine will be the most valuable specimen to reserve and the easiest to procure, and in order to obtain sufficient the doctor can ask for night and morning specimens and have them passed in his presence. The material or materials reserved should be placed in clean bottles, personally rinsed out by the doctor just before filling. They should be securely corked and sealed by him and labelled with the patient's name, date of collection, the nature of the material, and the initials of the doctor. On no account whatsoever should any preservative be added. It does not matter if the contents become foul during the time which elapses between the taking of the specimen and the analysis. The possible risk of a poison becoming decomposed is slight, but the addition of an antiseptic (in most cases a poison) may so complicate the examination that the analyst may be unable to give a definite report on the presence of poison. The doctor should content himself with keeping the bottles in a cool place.

Dying Declarations.

When a patient is dying but is of sufficiently clear mind to give an account of the facts leading to his illness, it will be the duty of the medical man to take a dying declaration. In cases of death by poison it will probably be rare that an opportunity will occur for a declaration to be made, but in accident and suicidal cases they may be of importance in removing suspicion from a third person in the investigation of the coroner's court. A coroner is not bound by the strict laws of evidence which exist in criminal courts. The essential point of these declarations is that the individual must realise that he is about to die and has no hope of recovery. They should be made in the presence of a magistrate if time permits, but if necessary must be taken down by the medical attendant. The following points should be observed by the doctor. He should:—

(1) Secure a trustworthy witness.
(2) Make certain that the individual is convinced that he is about to die; a statement by him to that effect should be made in the declaration.
(3) Write the exact words of the patient.
(4) Ask only those questions which are deemed essential to clear up any ambiguous or doubtful points, and asks as few as possible.
(5) Record questions and answers.
(6) Statements only of what was done to the dying man are relevant.
(7) Read the declaration to him and get him to sign it or put a mark.
(8) Sign it yourself and obtain the signature of the witness.
(9) If unconsciousness supervenes record as much as you can and sign it and obtain signature of the witness.

Should the patient recover, these declarations are invalid, as the individual is then able to give evidence himself and be cross-examined. Dying declarations are based on a legal assumption that a person in sight of death speaks the truth.

Withholding the Certificate.

If the medical attendant cannot give a certificate of death from some natural cause the coroner must be informed. If the patient is a stranger to him he should be specially on his guard, since a homicide may send for a stranger rather than a medical man who knows the family well. Or he may send for a strange doctor to witness the body and, failing to obtain a certificate from the latter, he may then apply to the family doctor, who knows the deceased's "constitution" and may be tempted to give a certificate on the strength of that general knowledge.

In all cases of death from poisoning it is the duty of the medical attendant to withhold certification of the fact and immediately to inform the coroner of the circumstances. This should be done as soon as possible, to enable the authorities to commence inquiries at the earliest possible date. Thus the event of accident or suicide will be cleared up without any suspicion, and at the same time the police will be best enabled to collect information to apprehend any guilty party in homicide cases. In cases where poison is only suspected the medical attendant must consider whether his suspicions are sufficiently certain and capable of proof to warrant his withholding the certificate. Further, he must consider whether anyone else is likely to inform the police if he does not; whether the police are likely to hear of the matter through any gossip, and whether any open accusation has been made in the household of the deceased in his (the doctor's hearing). If scandal has occurred, it is the medical attendant's duty to put the facts before the coroner and to abide by his decision.

The doctor should, before leaving the house, take possession of any bottle, tumbler, food, or material suspected of containing poison. Relatives even in suicide cases often attempt to destroy this evidence in the vain hope that any stigma resulting from the coroner's inquest may be avoided. The doctor may be pressed to give a certificate of death to avoid these inquiries, but he must be firm in refusal, else he may land himself in a very difficult position with the coroner, to say nothing of a possible charge of false certification of a legal document.

Chronic Poisoning and Notification.

In the case of patients suffering from chronic poisoning caused through the nature of their employment, it is the duty of the medical attendant to notify the Chief Inspector of Factories at the Home Office, giving the name and address of the patient and the nature of the disease from which the patient in the

opinion of his doctor is suffering. Notice must also be sent to the Factory Inspector and to the certifying surgeon of the district in which the factory or workshop is situate.

The diseases to which this applies are lead, phosphorus, arsenical and mercurial poisoning, and to infections from anthrax. A fee of 2*s.* 6*d.* is paid for the notification.

Sale of Poisons.

The statutes governing the sale of poisons are numerous and the provisions varied. Medical men, especially those who dispense for themselves, should acquire a working knowledge, in particular of the Poisons and Pharmacy Acts, 1868–1908; the Medical Act, 1858; the Medical Council Act, 1862; Dangerous Drugs Acts, 1920, 1923; Narcotic Drugs Orders, 1916, 1918. These various Acts lay down conditions under which various poisons and dangerous and narcotic drugs may be prescribed and dispensed; the keeping of records; schedules of poisons within the meaning of the Acts and conditions under which they may be sold by a doctor, by chemists, and by shopkeepers; the delegation of dispensing duties to unqualified persons and sale of poisons to unknown persons; regulations for labelling and placing of poison in distinctive bottles recognisable in the dark, &c; sale of narcotic drugs to lay people and officers of the armed forces of the Crown; colouring of arsenic before sale of that which is not used for medicinal purposes. In minor details the position varies in Ireland compared with the rest of the British Isles. In addition there are two Acts which may be mentioned as having a possible bearing on poisoning; these are (1) Poisoned Flesh Prohibition Act, 1864; (2) Drugging of Animals Act, 1876. These Acts are designed to prevent the unauthorised destruction of animals other than the destruction of vermin, but prosecution may be undertaken in the event of poisoned food being left about in such a manner that it might be consumed by human beings.

Range of Poisons Obtainable.

The Schedules of the Poisons and Pharmacy Acts, Arsenic Act, and the Dangerous Drugs Act limit the range of poisons likely to be used in this country and have a further bearing on the chance that any Act may be selected. The profession or trade of an individual must, however, be borne in mind, since he may have special access to poisons. Also, though to a less extent, failure to carry out the provisions of the Acts must be allowed for. Chemical manufacturers, chemists, and laboratory workers are able to obtain an almost unlimited range of poison, and can further obtain these poisons in a pure state without the addition of colouring matter.

There can be no doubt that the limitation of the sale of poisons in this country, and the recording of sales in the poison book at the place of purchase, has greatly limited poisoning not only in amount but also in range. Since the operation of the Dangerous Drugs Act the falling off of suicide from narcotic drugs is marked. When coal-gas, phosphorus (vermin-killer), arsenic (weed-killer or sheep-dip), strychnine (vermin-killer), barium (vermin-killer), antimony, mercury, and oxalate have been excluded, there are but few poisons which are likely to be obtained for homicidal purposes. The strong acids, alkalies, cyanides, carbolic group and, indeed, some of those mentioned above are unlikely to be used owing to the impossibility of disguise of taste and appearance. The possibility of scheduled and rare poisons being used must not be entirely disregarded, since these may be obtained by individuals abroad, but the chances of such access are generally ascertainable.

Accidental cases frequently arise from mistakes in handling of dispensed medicines, fatal medicines and lotions, and disinfectant solutions. Attempts to limit these have been made by regulations for keeping, dispensing, and selling of poisons carried by the Pharmaceutical Society with consent of the Privy Council, and these have done much to prevent accidental poisoning.

New Inventions.

PROSTATIC DIATHERMY.

IN order to apply heat to the prostate by a diathermy current I have used the electrode illustrated herewith. It is made in the shape of an ordinary cystoscope, the beak being made of vulcanite and the horizontal part of metal. One inch from the junction of the vulcanite and metal the metal is decreased in diameter so as to allow the greater part of the shaft to be covered by an insulating layer of silk web. The electrode is hollow, and a thermometer is fitted to it so that the temperature of the exposed metal part can be kept under constant observation. The electrode is used in combination with a lead girdle

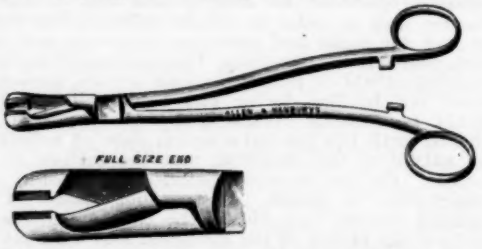
electrode round the pelvis below the iliac crest, in the same way as Cumberbatch has described for use in diathermy of the cervix. The internal electrode is passed into the bladder and the end is then depressed until the metal is horizontal; it is then withdrawn until the beak impinges on the internal meatus. Measurements in many cases have shown that the internal electrode in this position is very nearly in the centre of the lead girdle (within ½ inch). With the diathermy apparatus which has been used with it, a current of about 700 m.a. records a temperature of 114° F., which had been found not to cause any pain and not to be followed by any unpleasant after-effects. It is too early yet to report on the clinical value of this method of treatment, but it is here described as a method of applying heat by diathermy to the prostate.

This electrode has been made for me by the Holborn Surgical Instrument Co.

G. F. STEBBING, M.B., B.S. Lond.

COMBINED SCISSORS NEEDLE-HOLDER FOR PERINEORRHAPHY.

THE instrument here illustrated is most useful in the repair of perineums. No operation on the female genital organs causes so much irritation to the operator, requires so much assistance, or repays the patient and the community more than a successful operation for prolapse. The swabbing of the wound, the retraction of the cut edges of the vagina, the insertion, tying, and cutting of the numerous sutures,



requires many hands. I find the equivalent of one hand is saved by this instrument. The idea was suggested by seeing Mr. H. D. Gillies use his scissors needle-holder. The instrument explains itself. The assistant swabs and retracts by holding the short end of the last suture. The operator, by means of the instrument, inserts his suture, ties the suture with the instrument still in his hand, and then cuts the last short end and the long end of his present suture with the scissors in the needle-holder.

The scissors needle-holder is manufactured by Messrs. Allen and Hanburys, Ltd., of Wigmore-street, London, W. 1.

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